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The Results of Conservative Treatment of the Ovaries

BY

JAMES HENDRY, M.A., B.Sc., M.B., F.R.F.P.S.G., F.C.O.G.

Professor of Obstetrics and Gynaecology, The University of Glasgow.

THE purpose of the chief discussion at a British Congress of Obstetrics and Gynaecology is to afford, by exchange of experiences and discussion of those experiences, an opportunity of crystallizing our views regarding the special problem involved. An opening paper may, in those circumstances, be written in a more provocative manner than would be appropriate to an isolated scientific communication.

Historical review. A brief review of ovarian surgery will allow a better perspective in which to assess the present position. It is a continuing pride to gynaecologists that ovariotomy was the pioneer operation in modern abdominal surgery. From Ephraim McDowell's original operation, performed in December 1809 in a small backwoods township in Kentucky, progress was at first slow. McDowell himself operated on 13 patients with five deaths. In Great Britain the operation was standardized by Charles Clay, Baker Brown, Spencer Wells, and Thomas Keith, but up to 1871 the average mortality stood at about 25 per cent. Keith's record of 136 cases with 25 deaths was the best.

Into this band of pioneers in ovarian surgery dashed that volcanic personality Lawson Tait, belching forth in one direction violent controversy and acrid criticism, and in another almost incredible surgical energy. He performed his first ovariotomy in 1868, when he was only 23 years of age, and serving as a house surgeon in Wakefield: the patient died of peritonitis, but

the young surgeon was undismayed. In 1878 he published his first series of 50 ovariotomies with 19 deaths: in 1880 he published a second series of 50 ovariotomies with only three deaths, and in 1887 he was able to publish a record of 137 successive ovariotomies without a death. This achievement established the operation as a safe surgical procedure, but this would almost certainly have followed the great improvement in surgical methods which was then taking place under the influence of Joseph Lister. It is interesting to remember that Lawson Tait remained to the end a steadfast critic and opponent of Lister's methods, though by his scrupulous cleanliness in person, instruments, ligatures and dressings, his practice approached the aseptic rather than the antiseptic technique.

The extension of the indications for ovariotomy. Lawson Tait's influence on the scope of the operation of ovariotomy was more important: until his time the operation was only performed in the presence of some definite and palpable neoplasm in the organ itself. He records with pride that he was the first surgeon who deliberately removed an ovary because it was the cause of pain. This operation he performed in February 1872, and in August of the same year he removed both ovaries from a patient suffering from intractable uterine haemorrhage. In the same year a similar extension of the field of ovarian surgery was made by Hegar of Freiburg, who removed both ovaries in a case of pelvic pain and dysmenorrhoea, and by Battey of Rome, U.S.A., who removed both ovaries for amenorrhoea and hystero-epilepsy. This development of pelvic surgery met with a rather hostile reception: the British medical press referred to Lawson Tait's operation as the "spaying" operation, and in America the usual reference was to "Battey's normal ovariotomy". It took Lawson Tait many years to convince his colleagues in this country that the removal of the uterine appendages was a right and proper operation. The safety of the operation was established, and eventually ovaries of apparently normal structure were readily removed for the cure of intractable dysmenorrhoea, pain apart from menstruation, irregularities of menstruation including even amenorrhoea, hystero-epilepsy, and other symptoms much more obscure. Neither a master knowledge of anatomy nor great operative dexterity was necessary. The aftermath soon came—the authors must have regarded with a savour of guiltiness the collections of normal ovaries removed by the Lawson Tait and the Battey operations.

This stage represents the deepest degradation of pelvic surgery

—the removal of healthy organs without consideration for the functions which they serve in the female body. Little was then known of endocrine glands, but the steady development of physiological knowledge has carried us far from those barbarous days. The old practice just persists in the sporadic removal of ovaries on the ill-founded belief that they are the cause of pelvic pain. So far have we travelled that we are now advised to save for a woman in the course of a pelvic operation some little portion of ovarian tissue which may either be conserved in the pelvis, or implanted in a variety of other situations. The practice of ovarian grafting has been recognized for many years, but we are now having advocated supplementary procedures such as the simultaneous grafting of endometrial tissue to intensify the vitality of the ovarian graft.

Ovarian grafting. In this country there has been a certain want of enthusiasm about ovarian grafting—many of my colleagues with whom I have corresponded assure me that their cases have been so occasional that they have not recorded them specially. Just two years ago the late Professor Blair-Bell[1] complained that ovarian grafting had been sadly neglected in this country. Our discussion to-day may show whether this alleged neglect has been culpable.

The exponents of ovarian grafting have been able to supplement their clinical experiences by experiments in animals, and to study the histological changes in those grafts in relation to function. What do the grafters offer us? In the first, and also the most important place, they all take the trouble to state that grafting can never be weighed in the balance against the preservation of the natural connexions of the human ovary.

The amount of tissue for an individual graft must be small—the optimal size is 8–10 m.m. in diameter and much less in thickness.[2] Multiple grafts should be used. While the germinal or capsular epithelium does show proliferative powers in a successful graft, its presence is not essential, and it was actually removed by Blair-Bell. The essential component of the graft is the primordial follicle with its immediately surrounding tissue. The centre of the graft tends to atrophy, and the vitality of the graft depends on vascularization from the periphery. When revascularization has been completed, the primordial follicles continue their development, mature ova appear, and then regressive changes take place. It is interesting to note that luteinizing changes only continue when uterine tissue is present in the body. In spite of the activities just recorded, there is a

steady tendency towards atrophy, and there appears to be almost unanimity among the workers in this field that the life of an ovarian graft does not extend beyond two or three years. It is also interesting to note in experimental work that there appears to be a greater tendency to cyst formation in the graft when uterine tissue is absent. A few years ago Max Cheval[3] recommended the simultaneous grafting of uterine mucous membrane to support the ovarian graft in cases in which the uterus had been removed. In his experiments in animals, and in one patient, he found that the endometrium tends to arrange itself round a cavity which varies in tension from time to time—this cavity with its lining is essentially an endometrioma.

Results of ovarian grafting. In examining the clinical records of the patients in whom grafting has been performed, we find the most successful results in those in whom the uterus has been conserved. In a series of 113 patients in whom menstruation was possible, Blair-Bell[1] obtained successes in 70 per cent. Very recently L. Mayer, of Brussels,[4] reported a series of 45 such cases with continued menstruation in 95 per cent, but in six of the cases the function disappeared by the end of two years. There is an interesting relation between experimental and clinical work in that it is quite usual to find that, after grafting, menstruation does not reappear for four to six months—that is, until the graft has been revascularized. In view of the limited duration of graft vitality, it is difficult to explain those cases recorded by Blair-Bell[1] in which menstruation continued for 16 and for 13 years after operation—is it the graft which continues this function, or has some other gland such as the thyroid or pituitary acquired the power? In proof of the superiority of ovarian tissues in its normal relations over grafts, Blair-Bell records that whereas 68 per cent of his cases of acro-hysterectomy retained menstrual function in the presence of an ovarian graft, 89 per cent retained that function when an ovary was left *in situ*.

Limitations of ovarian grafting. Ovarian tissue should not be used for grafting purposes when inflammatory changes are evident or when there is any suspicion of malignancy, though it is suggested that malignant ovarian tissue could more easily be removed from the abdominal wall than from the pelvic cavity. Several records occur of ovarian grafts requiring removal because of cyst formation. Blair-Bell quoted two such cases out of 150 grafts,[5] and Bickenbach[6] found cystic degeneration in 8 out of 99 cases. When we consider the supplementary graft of

endometrium recommended by Max Cheval[3] we remember that the vitality of the graft appears to depend essentially on the formation of an endometrioma—those of us who may have had the misfortune to deal with an accidental post-operative endometrioma in the abdominal wall may well refuse to incur this risk. Mayer[4] alludes naïvely to a successful case of retention of menstrual function following an ovarian graft in which the associated dysmenorrhoea was so great as to require a presacral neurectomy! There are many references to troublesome menorrhagia and metrorrhagia following successful grafts. When we look at the possible extensions of graft therapy, especially by homografts—that is, ovarian tissue obtained from other women—we find as suggested fields, menopausal disturbances, natural and artificial, and secondary amenorrhoea. Are such procedures justified if the power of graft is of such limited duration as most observers suggest?

Conservation of fertility. From the racial point of view the most important object in the conservative treatment of the ovaries is the conservation of fertility. Continued fertility after unilateral oöphorectomy is a commonplace—even when the second ovary has been the seat of surgical interference, a very small residue of ovarian tissue may prove effective. Three years ago I operated on a parous woman, aged 35, whose third and youngest child was then six years of age. She had a dermoid cyst about $3\frac{1}{2}$ inches in diameter growing in her right ovary; the tumour had so disorganized the ovary that the right adnexa were removed. On the left side there was a smaller dermoid—about $1\frac{1}{2}$ inches in diameter—growing in the outer pole of the ovary. I was able to shell this tumour out and to stitch together a small residue of ovarian tissue: her fourth pregnancy commenced five months later. Some 30 years ago one of our most prominent surgeons in the west of Scotland removed bilateral ovarian cysts from a young woman. A year later he was a melancholy guest at her marriage, and expressed regret to a colleague that there could be no offspring from this happy union. The good lady bore her husband one son and two daughters.

Fertility depends not only upon the conservation of the ovary, but also on the access of the mature ovum to the uterine cavity. In the absence of a patent Fallopian tube, this access requires to be secured artificially. One of the most successful techniques is that devised by Estes senior, and practised by his son; the interstitial tubal opening to the uterine cavity is exposed, a slice removed from the ovary, corresponding accurately in size to the

cavity thus prepared for it, and inserted into the cavity. In a series of 50 cases which Estes junior[7] was able to follow up, four became pregnant, and of those, two had full-time pregnancies. Tuffier employed a similar method in which the ovary was not detached from its vascular connexions but inserted through an incision in the posterior wall of the uterus so that the surface protruded freely into the uterine cavity. From this technique Tuffier reported in 23 cases only one full-time pregnancy.

In considering fertility in terms of ovarian grafting, experimental results have proved very uncertain, and on the whole disappointing. In women the results are also disappointing, though occasional successes have been reported.

For the conservation of fertility a mere fragment of normal ovarian tissue in its normal relations may give an unexpected success, whereas the results of transposition and grafting are so uncertain as to make an operation of this type extremely speculative.

Conservation of menstrual function. The conservation of menstrual function is mechanically more easy to secure than fertility. The presence of functional ovarian tissue, even in an abnormal situation, will secure the necessary changes in a persisting area of endometrium. Even when the greatest part of the body of the uterus has been removed a small area of endometrium will undergo cyclic changes. The amount of ovarian tissue necessary for this purpose, as for fertility, is very small. After a unilateral oöphorectomy with the uterus saved, there is rarely a gap in the menstrual cycle, and the small residue of a single remaining ovary tends to hypertrophy and maintain menstrual function for an indefinite period. The desirability of saving ovarian tissue during the removal of a simple ovarian neoplasm has already been referred to, but where there is any evidence of malignancy a radical operation is the only sound procedure.

The present tendency in gynaecological surgery generally is conservative, and particularly so in inflammatory lesions. The results are very satisfactory, not only in immediate mortality but also in restoration to health and even in continued fertility. Even those who advocate the immediate operative treatment of acute pelvic infection, aim at conservation of function, and are anxious to record persisting fertility after such treatment. In cases of gonococcal infection of the pelvis, Curtis[8] gives the percentage of patients who will ultimately require operative treatment as less than 15 per cent.

When we delay an abdominal operation until the quiescent stage has been established, the usual indication being persisting ill health, we operate under the best conditions. When the ovaries are distorted and contain numerous cysts, the tubes thickened and adherent, and the uterus fixed to the surrounding structures by adhesions, complete extirpation of the reproductive organs is probably the better policy. In this matter I prefer to align myself with those who practise radical surgery of the uterus, including the cervix, because of the well-established pathological risks, rather than with those who would be conservative for the sake of a temporary physiological advantage. Where we find the reproductive organs of relatively normal form but displaced by adhesions, it is usually possible to find a surgical procedure without excessive mutilation. When the uterus, or a menstruating part of it, is saved as in operating for the removal of tuberculous Fallopian tubes, it is always good policy to conserve some ovarian tissue, preferably in its normal relation. The tissue saved should be healthy: if a septic ovary is conserved, the patient will almost certainly require one more operation. In cases of this type, there are occasions—I myself find very few—on which it may appear preferable to trust to a small graft of ovarian tissue in the abdominal wall, rather than to an uncertain residue in the pelvic cavity.

It is in the cases of conserved uterine tissue with the power of menstruation, that the practice of ovarian grafting has had its greatest success. A more conservative primary attitude towards pelvic lesions, especially inflammatory lesions, has probably diminished the number of cases in which ovarian grafting has even to be considered.

Avoidance of menopausal disturbances. The third purpose of conservative treatment of the ovaries is the avoidance of that disturbance of endocrine balance which we term the pathological menopause. Success in this purpose is the most difficult to assess—it depends on a series of subjective phenomena which may vary widely in different individuals. A most admirable analysis of the menopause in one thousand healthy British women, drawn from all walks in life and assessed by modern statistical methods, was carried out by the Council of the Medical Women's Federation a few years ago.[9] Eight per cent reached the menopause before the age of 40. The commonest symptom, flushings occurred in only 62.3 per cent of the whole, and persisted usually for 2 to 3 years, but sometimes for 8 to 10 years. Other recorded symptoms in the order of their frequency

were headaches, giddiness, nervous instability, and obesity. Only 15.8 per cent passed through the menopause without symptoms, and in all 20.8 per cent were relatively slightly disturbed. Of those thousand healthy women, 10.3 per cent were definitely incapacitated by the menopause. With such variations in healthy women, what can we expect in women who are the victims of pelvic disease for which operative measures have been considered?

The real difficulty in this assessment is due to the uncertainty of our tests for ovarian function. What we regard as symptoms of the menopause, such as flushings, may be present for a long time before menstruation ceases, and Robson[10] has shown that the secretion of oestrin may be identified many years after the periods have ceased. Oestrin secretion may be taken as a proof of continued ovarian function, and is associated with well-marked properties in the vaginal walls and vaginal secretion. The problem has been studied in the Glasgow Medical School throughout the past eight years by R. Cruickshank, Baird and Sharman,[11] who have shown that so long as the ovaries are in active function the vaginal mucous membrane has a high glycogen content, the vaginal flora is of the homogeneous Grade A type (consisting almost entirely of Döderlein's bacilli) and the vaginal secretion is highly acid (ϕH 4.0 to 4.6). If we wish to get a true assessment of ovarian function, we should adopt the methods of the biochemist and the bacteriologist in estimating the excretion of oestrin and examining the vaginal secretions, instead of tabulating the subjective pheomena of the suspected menopause. In my own department we are conducting an investigation into this problem, but our material is not yet adequate for publication.

In those cases in which the uterus, or a menstruating part of it, has been saved, we may take the menopausal symptoms as following very closely the course of menstruation. When the uterus has been removed, the balance of clinical evidence is that the conservation of ovarian tissue, even under the most favourable conditions, makes little difference to the onset of menopausal symptoms. The variation in individual cases is hardly greater than the menopausal variations in healthy women. In my own patients I have frequently seen menopausal symptoms more marked when the ovaries have been saved than when they have been removed. I am in complete agreement with several of my British colleagues that in relatively young women who may have been subjected to a very radical opera-

tion, the menopausal disturbance is often not only of brief duration, but also very slight. One knows with what anxiety certain women inquire whether the ovaries have been saved—how far can these menopausal symptoms be influenced by psychic factors?

If it is of little value to conserve ovarian tissue *in situ* when the uterus is removed, then in those circumstances the grafting of ovarian tissue is almost vexatious. At the best this procedure can only postpone menopausal symptoms, and in many cases the short, sharp menopausal phase is less trying to the patient than the prolonged slighter type. Even now Tuffier's dictum seems to hold good—"when the uterus is absent, ovarian transplantation is of no value." Since we are dealing only with menopausal disturbances we may call in the aid of the various standardized oestrin preparations, as it is a matter of common experience that for this purpose the administration of oestrin gives more certain results than in almost any other conditions for which it is recommended.

Dangers of conservation of ovarian tissue. Every now and then we come across records of tumour formation in ovarian tissue which has been treated conservatively—very rarely these tumours are malignant. In the past nine years I have operated on 33 patients for the removal of ovaries conserved at a previous operation—in 29 there had been simple cyst formation; in two, ovarian sarcomata, and in two, granulosa-cell tumours. The two latter were met with after I had the opportunity of seeing Walter Schiller's[12] specimens in Vienna; the two earlier cases diagnosed as sarcomata may have been of the same type—one of the patients is certainly still alive and well.

Conclusions.

For the purpose of this discussion I should like to suggest the following conclusions:

1. Healthy ovarian tissue should be saved *in situ* whenever that is possible. A mere fragment may prove effective.

2. The conservative treatment of pelvic inflammatory lesions has reduced the call on supplementary surgical measures to conserve ovarian function. Late operation, should it become necessary in such cases, allows much better scope for conserving ovarian tissue in its natural relations.

3. When the uterus, or a functional part of it, is saved, it is always preferable to conserve ovarian tissue *in situ*, but there may be occasions when an ovarian graft becomes advisable.

4. When the uterus is removed, the conservation of ovarian tissue is not essential, and may give rise to difficulties at a later date. The function of the retained or grafted ovarian tissue is of such limited duration that it might be substituted by the administration of standardized ovarian hormones.

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[*The discussion on this subject at the Congress of Obstetricians and Gynaecologists at Belfast is on page* 764.]

The Conservative Treatment of Pathological Conditions of the Fallopian Tube *

BY

BETHEL SOLOMONS,

M.D., F.R.C.P.I., F.C.O.G., Hon. F.A.C.S.

Visiting Gynaecologst, Dr. Steeven's Hospital; Late Master Rotunda Hospital, Dublin.

SYMPATHY should always be extended to people like Monsieur Piccard, who explores the stratosphere; to Malcolm Campbell, who endeavours to motor at three or four hundred miles an hour; to research workers on cancer problems, and last, but not least, to those who keep on endeavouring to solve the problem indicated by the title of this paper, and who, in spite of all efforts, attain so small a percentage of successes that many gynaecological surgeons have given up the quest in despair. It certainly is rather a thankless task, for the work must be done with meticulous care and the exercise of great patience, and even then, in the majority of cases, there may not be any results to show except such satisfaction as the patient gains when she can be told that the last effort has been made.

In considering the question of the conservation of the Fallopian tubes, salpingitis must be deemed the chief aetiological factor, and a classification of salpingitis must be made into acute and chronic.

Acute conditions were effectively dealt with at a previous congress, and in a discussion at a meeting of the British Medical Association.[1] The general opinion at the congress was that conservative treatment was the choice and that operation, except when abscess formation had occurred, was definitely contra-indicated. There are still gynaecologists who favour radical measures, but there do not seem to be statistics to uphold their opinions.

If I am able definitely to diagnose acute salpingitis, and it is a rare disease and difficult to diagnose, I will not operate, and I have not seen ill results from palliative measures. With this, the subject of acute salpingitis is left for discussion, and the subject of the chronic conditions must now be considered.

Before approaching the main subject of the paper certain

*Paper read by invitation to open a discussion at the British Congress of Gynaecology and Obstetrics, Belfast, April 1936.

points must be dealt with. Such matters as the length, direction and peristaltic action bear directly on the question of treatment. According to the description in most textbooks the Fallopian tube is almost four inches in length. It always seemed to me that the Fallopian tube appeared longer when screened, and Rubin[2] mentions that it often appears to be six to nine inches long and that this may be due to stretching out by the ethidol or lipiodol used. The way in which the Fallopian tube leaves the uterus has been described differently by various observers. In radiograms observed by me the tube nearly always leaves the uterus straight. Geist and Goldberger[3] have described other methods of exit and suggest that tortuosity of the Fallopian tubes at the tubo-uterine junction accounts for high-pressure readings and may prevent entrance of spermatozoa, but Rubin is very keen on the necessity for differentiating between the modes of exit in the living and in the dead, and is of the opinion that the straight exit is the usual one in the living. Hemstein and Neustadt[4] agree with Geist and Goldberger. They suggest that the uterine ostium is not a fixed point, but the uterine cavity is drawn into a funnel at the apex of which the Fallopian tube begins. The course of the tube varies when fibroids and retroversion of the uterus are present. In addition the hard corey feeling of the portion of the tube just outside the intramural part has given the impression of disease whereas it is really due to an excess of circular muscle fibres in this portion. When fibroids and retroversion are present an impression may be conveyed that the Fallopian tubes are closed when insufflation is done; an impression which is corrected when an X-ray film is taken or when retroversion is corrected.

Rubin[5] draws attention to another very important fact. He shows by means of his kymograph that under diseased conditions the rhythmic and peristaltic actions are inhibited and paralysed. Both he and Kehrer[6] demonstrate that narcosis affects tubal motions even to the extent of destroying them. This certainly is an argument for insufflation without anaesthesia. Personally, I never was altogether satisfied with insufflation under an anaesthetic, and was more than interested when I read of these investigations. Apart from anything else stertorous breathing interferes with auscultation of the Fallopian tubes.

Another interesting and important fact has emerged from the physiological experiments of Corner[7] who showed a definite relation between rhythmic contractions of the Fallopian tube

and the menstrual cycle, both of which depend on ovarian function. Others, such as Wislocki,[8] Guttmacher and Kok,[9] worked on somewhat similar lines. Rubin, who has drawn our attention to these points, states that Guthmann was the first to record that manometric fluctuations were due to tubal peristalsis.

This question of the relation of ovarian function to uterine peristalsis is all important, and there has not been nearly enough stress laid on it. It certainly must account for some cures of sterility by the injection of powerful hormones, i.e. the indirect action of the hormones on the tubes. Further Soria[10] shows that the innervation of the tube is intimately associated with the innervation of the ovary. It is important, too, to remember that it has been demonstrated that there is a degree of tonus at the tubo-uterine junction which must be overcome, that it acts like a valve opening and closing in a rhythmic manner. Other evidence, produced especially by Soria,[10] points to the existence of a sphincter-like apparatus at the tubo-uterine junction. He also demonstrates a type of sphincter at the abdominal orifice.

It must be reiterated that all these facts are very important to recognize, as closed Fallopian tubes might be seen and have been wrongly diagnosed, and plastic operations unnecessarily attempted.

With regard to function Kaufmann[11] states that the fimbriated end of the Fallopian tube remains passive during the passage of the ovum. It is difficult to realize how he found this out, but, if true, it seems to account for the fact that pregnancy can occur without the fimbriated ends of the Fallopian tube, and it certainly does on rare occasions.

The blood-supply of the Fallopian tube is well known, but little work has been done on the finer innervation. The musculature of the tubes is so important that its nerve supply must be mentioned. Whether an operation on the parasympathetic would have any effect in curing sterility due to faulty peristaltic action is difficult to say. Some investigation might well be made with benefit on this subject.

To Harting[12] we owe a debt for his exposition. In his paper he dwells on the nerve supply to the different portions of the tube. The large nerve bundles occur mainly in the longitudinal section of the subperitoneal tube whence they pass in numerous ramifications to the musculature.

The nerves within the muscular layer are motor in function and probably help the action of the tube in drawing the ovum into its lumen.

The nerves of the mucous membrane are sensitive in order to set in activity the reflex muscular action after penetration of the ovum. The nerve supply possibly acts also on the blood-vessels.

It is not intended to mention the various pathological conditions of the Fallopian tube. If the tubes are closed and it is decided to operate, the pathological condition found (i.e. salpingitis) is of no account unless tuberculosis is present, then conservation should not be attempted—it is useless.

According to Kaufmann the consequences of salpingitis may be placed in the following order: perisalpingitis, kinking, tortuosity, closed abdominal ends. Following this hydrosalpinx, haematosalpinx or pyosalpinx may occur. The Fallopian tube according to the degree of filling and the presence or absence of adhesions becomes twisted, contorted, kinked, spindle-shaped, sausage-shaped or retort-shaped.

Treatment.

The treatment may be considered under three headings.

(A) The Fallopian tubes may be left completely alone after the diagnosis of closure, or disease, or both has been made by bimanual examination, insufflation with air or by X-ray examination after injection of the uterus and Fallopian tubes with some opaque substance such as lipiodol or ethidol.

(B) Such measures as frequent vaginal douches, tampons, and diathermy may be employed.

(C) Operations.

It will be seen on reference to the answers to the questionnaire that opinion is divided.

(A) It is universally agreed that the insufflation of the Fallopian tubes with air, or with an opaque material, is useful and every worker has had therapeutic cures of sterility even though Rabinner[13] shows that the routine injection of lipiodol is not harmless and that it causes morbidity and mortality even though small, and quotes Odenthal.[14] B. C. Hirst[15] and Gauss[16] in a review of the literature found five deaths and 13 cases of infection in about 2,000 cases. Special stress is laid by Hirst on the danger of infection if operation is done immediately after the injection of iodized oil. Gaggaze,[17] Rubin,[18] Baer,[19] and Gelhorn[20] also draw attention to the danger.

So far we have been fortunate. We have for many years used ethidol, which seems to cause less pain and requires less pressure to force it upward.

(B) Douches, tampons and diathermy have not practically any place in the treatment of chronic infection of the tubes.

(C) Operation.

It was found in the study of the various views on this point that the camp is divided into three divisions: one which will not operate on the Fallopian tubes at all, a second which will only take the step which yields the most favourable results (that is, operation at the ampullary end only is attempted), and a third which is very much in the minority and will operate on any portion of the Fallopian tubes.

All are agreed, and I am entirely with them, that the situation must be clearly defined for the patient and her husband, that nothing must be done until the husband has been tested, and until such tests of safety as the settling time of the blood have been carried out.

Finally, the position must be made very clear. It must be pointed out if the closure of the Fallopian tubes is at the fimbriated end that the operation is well worth doing, while if it is at any other position in the tubes the results are doubtful, that the chance of success is very small and that it is entirely a question for the patient and her husband as to whether the operation be attempted or not. Personally I find real difficulty in preventing people from having operations performed. If, at the menopause the last possible treatment has not been tried the patient feels that success might have been hers, while if everything has been attempted there are not any regrets. If an operation is decided upon, are there any contra-indications?

Certainly there are. A fast sedimentation rate, any rise of temperature or pulse-rate, a history of tuberculosis.

The last is a difficult fact to elicit, and it is a difficult thing to diagnose when the abdomen is opened. This point has been raised by me before. If it can be diagnosed, an operation is not done; if the abdomen is opened and it is then diagnosed, double salpingectomy is the operation of choice. Palliative measures are of no avail. Whether the Fallopian tubes be thickened or in a state of pyosalpinx the operations performed by me are the same and have been described and illustrated in previous communications.[21] If hydrosalpinx is diagnosed, salpingolysis is

performed, i.e. the fluid is milked from the tubes and any necessary oversewing and insertion of catgut is done.

In speaking of conservation of the Fallopian tubes reference must be made to the pioneer work of H. Martin[22] so long ago as 1885 and later in 1895, and to Gouilloud,[23] Seitz,[24] Strassman,[25] Jalles,[26] Douay,[27] A. Mayer,[28] Toppuse,[29] Reiprick,[30] Tweedy,[31] Bonnet,[32] and many others.

Finally, the excellent technique of Holden and Sovak[33] must be specially stressed. Whether operations are to consist of resections, transplantations, or salpingostomies, depends on individual operators, also it is a moot point whether catgut should be inserted or not.

Browne, working with rabbits, did not obtain patency after the insertion of catgut, but patency has been so frequent after its use in human beings that I continue inserting it. Banister and others have also reported patency.

There is difficulty when working with animals in keeping the field aseptic.

Questionnaire and Technique.

In view of the diversity of opinions which seemed to exist on the subject of operating on the Fallopian tubes in any case, I decided that the most valuable thing to do was to obtain the opinion of gynaecologists in different parts of the world by means of a questionnaire and to collect the literature for further information. The questionnaire was sent to 150 gynaecologists. Many replied that they did not operate on the Fallopian tubes as they had not found it worth while. A reply was not received from many others who either did not think it worth while, or refused to answer on principle, and there must have been some to whom my letters probably miscarried.

The Questionnaire.

To those who replied to my questionnaire very sincere thanks are hereby tendered. It is not intended to give a list of those to whom the letter was sent.

The questions asked were as follows: (1) Do you operate on the Fallopian tubes for sterility? (*a*) fimbriated end, (*b*) other parts of the tubes. (2) What operation do you prefer? (3) What results have you obtained? (*a*) *re* pregnancy, (*b*) *re* patency, (*c*) *re* general health. (4) Any other comments.

TABLE I.

The names of those gynaecologists who operate on the Fallopian tubes.

Questionnaire:

Those who operate on the Fallopian tubes sometimes.—They operate on the fimbriated ends, but a few only operate when laparotomy has been done for some other indication.	The following operate on other parts of the Fallopian tubes:
Doctors Åhlstrom, Bonney, Browne, F. J. Banister, O'D. Browne, Berkeley, Barris, Boshawer, Blair-Bell†, Bocura, Cook, Curtis, Datnow, De Sa, De Lee, Douay, Douglas, Essenheim, Flew, Fernwald, Gilmour, Gibbard, Gellhorn, Green-Armytage, Hendry, Holden, Hewitt, Jarcho, Johnstone, R. W. Kernin, Lettergrew, McIntyre, Mahfouz, Meaker, Macafee, Norris, Novak, J. Purandare, Pride, Rivett, Rubin, Stacey, Drew-Smythe, Stein, Sonak, Treston, Theobald, Taylor, Titus, Van Rooy, White, Whitehouse, Westmann.	Doctors Åhlstrom and Lettergren, Holden and Sovak, Rubin, Meaker, McIntyre, Berkeley, Bonney, Barris, Beckwith Whitehouse, Datnow, Drew-Smythe, Gilmour, O'D. Browne, Blair-Bell†, Theobald, De Sa, Westmann, Mahfouz, Norris, De Lee, Titus, Douglas, Pride, Van Rooy, Joseph Novak, Green-Armytage, Douay, Hewitt, and Bethel Solomons.

[† Died, 25th Feb. 1936.]

In addition there are numerous gynaecologists in the world with whom it was impossible to get in close touch.

The general trend of the replies was "The abdomen is not as a rule opened directly for the purpose of operating on the Fallopian tubes, but if the abdomen is opened for any other reasons and the tubes are at fault the abdominal ends are resected and adhesions are separated."

Many others opened the abdomen if it was shown that the fimbriated ends were closed after insufflating the Fallopian tubes with air or some opaque substance. Some few opened the abdomen and tried to form new Fallopian tubes, no matter what part of the tube was involved. All of us who do believe in plastic tube work will agree that it is most important to impress on the patient that the chance of pregnancy is very small, but if she likes to have an operation performed it can be done.

It is necessary now to refer to Table II. In this Table will be found tabulated the information received from gynaecologists, to whom I owe my sincere thanks, and some statistics from the literature.

TABLE II.

Questionnaire and literature.

Name	Operation performed	Pregnancies	Patencies	Notes
Rubin.	Salpingolysis, salpingostomy, implantation.	8 in 31 operations of last series.	Many after implantation, but no pregnancies.	Writes he is operating more and more on all parts of the Fallopian tubes.
Norris.[34]	Various.	4 in 8 operations.	One after resection and implantation.	———
Holden and Sovak.	In 10 patients 7 had reconstruction for occlusion of the outer third and 3 of the inner third of the Fallopian tube; of the latter 2 showed patency.	30 in their first series —1 of these in an implanted case and another after reconstruction of the outer third of the Fallopian tube.	Numerous.	Are doing an increasing amount of resection work. Reference to their work is given.
Meaker.[35]	———	9 in 19 salpingostomies.	———	Patency is more frequent than pregnancy.
Beckwith Whitehouse.	Salpingostomy and tubal grafting.	2 after bilateral grafting.	———	Excellent psychological effects.
Drew-Smythe.	Salpingostomy, etc.	1 after salpingostomy.	Majority after all operations patent.	———

TABLE II (*continued*).

Questionnaire and literature.

Name	Operation performed	Pregnancies	Patencies	Notes
Blair-Bell†.	All operations.	70 per cent after salpingostomy. 1 pregnancy after resection of the isthmial portion with implantation.	Many.	Mentions numerous cases of interest.
Westmann.	All operations.	2 pregnancies in 8 cases of salpingostomy. 1 after transplantation.	———	———
De Lee.	Various.	Mentions 3 pregnancies in 20 operations of E. Davies.	50 per cent after all tubal operations.	———
Pride.	Resections and salpingostomy.	2 pregnancies after distal resection and 1 after isthmial resection.	———	———
Kernin[37] and Polak.	Various.	Many.	———	———

TABLE II (*continued*).

Questionnaire and literature.

Name	Operation performed	Pregnancies	Patencies	Notes
Åh'strom and Lettergren.	Operations on all parts of the tube.	9.1 per cent pregnant. 41 after loosening adhesions and opening the Fallopian tubes.	——	Prof. Åhlstrom was most generous with his information.
Marion Douglas.	All types.	6 pregnancies after the cuff operation.	——	——
Douay.	10 salpingostomies. 14 partial salpingostomies with adaptation of the Fallopian tube to the ovary. 7 tubo-uterine implantations after resection stenosed uterine cornu.	1 abortion after tubo-uterine implantation and one after salpingostomy. In another series of 10 cases, one pregnancy following salpingolysis and salpingostomy and one abortion after ovarian uterine implantation.	Verification by salpingography.	Good health in all. No mortality.
James Hendry.	Only operates if abdomen is opened for some other condition.	——	——	——

TABLE II (*continued*).

Questionnaire and literature.

Name	Operation performed	Pregnancies	Patencies	Notes
R. W. Johnstone.	Salpingostomy.	2 pregnancies in 20 cases.	———	———
Barris.	All operations.	1 pregnancy after salpingostomy.	1 patency after implantation.	Gave me much information.
Stein.	6 operations reported.	2 pregnancies.	4 patencies.	
Curtis.	Fimbriated ends.	———	———	Satisfactory results with operations on the fimbriated ends of the Fallopian tubes.
Datnow.	———	None.	All cases of salpingostomy and grafting were patent.	———
Green-Armytage.	All portions.	None in 25 operations in the isthmial and interstitial portions. 4 pregnancies in 26 cases after salpingostomy.	Verification by salpingography.	Used silk-worm gut to thread the Fallopian tubes.

TABLE II (*continued*).

Questionnaire and literature.

Name	Operation performed	Pregnancies	Patencies	Notes
Kernin.[37]	———	Quotes Fuchs and Ritter[38] 6 per cent, Seitz 9 per cent.	———	———
A. Martin.	———	2 pregnancies in 47 "follow-ups".	———	———
French literature.	All varieties.	10 per cent.	———	———
Cary.[40]	———	22 pregnancies in 232 salpingostomies.	———	———
Unterberger.[39]	———	57 salpingostomies with 8.77 per cent pregnancies. 3 implantations with 1 pregnancy.	———	———
Hewitt.	———	1 case of implantation, may have had a miscarriage.	———	———

TABLE II (*continued*).

Questionnaire and literature.

Name	Operation performed	Pregnancies	Patencies	Notes
Gellhorn.	Fimbriated end and always in connexion with operations for other conditions which were the primary indications for surgical intervention.	8 pregnancies in 40-odd cases, i.e. 20 per cent.	———	Mentions his work with Kernin and is very strong in his condemnation of iodized oil, which he says may cause peritoneal irritation and sterility.
Van Rooy.	Fimbriated ends. Has devised a technique of his own.	4 pregnancies in 16 cases, i.e. 25 per cent. No successes with implantation.	———	———
Joseph Novak.	All parts of the Fallopian tube—catgut threading.	No definite statistics, but knows of 2 patients pregnant.	———	Dislikes operations because of unfavourable results.
Bethel Solomons.	Operates on all parts of the Fallopian tube.	8.2 per cent of all pregnant.	Verification of patency by CO_2 or by salpingography or both. Patency 50 per cent.	———

Enough has been said to show that unless the Fallopian tubes are closed at their fimbriated ends an operation is only just worth while. I have often felt I ought to stop but, as an occasional good golf shot impels the worst players to persist with the game, so occasional successes impel me and others to try further. When keen workers like Rubin and Meaker continue to try to help the miserable sterile woman by their methods, and many such women are very miserable, it behoves us in spite of our numerous failures to continue our efforts to achieve improved results.

Summary and Conclusions.

1. Acute salpingitis is only mentioned to be dismissed with the remark that palliative treatment is the one of choice.

2. The tube appears larger when dilated by some kind of iodized oil. It leaves the uterus straight as a rule.

3. Anaesthesia interferes with peristalsis of the tube.

4. Reference is made to work done showing a definite relation between rhythmical contraction of the Fallopian tube and the menstrual cycle. This may account for the cure of sterility in some cases by the injection of large doses of hormonic preparations.

5. Kaufmann points out that the fimbriated end of the Fallopian tube remains passive during the passage of the ovum. This seems to account for cures of sterility even after the removal of the fimbriated ends of the Fallopian tubes.

6. Lipiodol is not altogether safe.

7. When operative treatment is considered the whole situation must be placed before the husband and wife. It must be pointed out that the chances of success except at the fimbriated ends are extremely small. In view of even the small number of successes a further effort must be made to attain a better technique. Before operation is attempted the husband must be tested and the woman must be in a fit condition.

8. The results of a questionnaire are given. Some of the best known gynaecologists in the world give their opinion as to whether or not to operate. Some never operate on the Fallopian tubes, some operate only on the fimbriated ends, others operate on all portions of the tube.

9. The average percentage of successes after operation is about 10.

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[*The discussion on this subject at the Congress of Obstetricians and Gynaecologists at Belfast is on page* 764.]

The Results of Conservative Treatment of the Uterus.

BY

A. LEYLAND ROBINSON, M.D. (Lond.), F.R.C.S. (Eng), F.G.O.C.
Professor of Obstetrics and Gynaecology, University of Liverpool.

CONSERVATISM as a medical term has been defined as "the power or tendency to preserve in a safe or entire state" and, therefore, conservative treatment of the uterus may be considered to include all forms of therapy which tend to preserve life and to conserve the function and structure of the female sex organs. The conservation of the reproductive function has always been a matter of vital importance to the human race, and means of achieving this object have exercised the human mind since the dawn of civilization. The methods now available for this purpose have been evolved by a slow process of development which began and germinated in the mists of antiquity when primitive man first set himself to master his environment and subdue the brute creation.

The primitive struggle for existence demanded from each individual a constant effort towards the achievement of personal safety, and this daily discipline implanted deep in human nature the instinct of self-preservation, an instinct which has always exercised a dominant influence upon medical methods, and remains to-day the first principle of conservative treatment.

But individual safety had little evolutionary value apart from the survival of the family, because the process of evolution was itself dependent upon the propagation of the species, or in other words, upon the successful exercise of uterine function. Reproduction has always imposed a burden upon the individual and chiefly upon the female of the species, but the altruistic quality of this impulse has been concealed under the guises of sexual desire and maternal instinct, and as such, its influence upon the human mind has been second only to that of self-preservation.

In so far as primitive man based his conduct upon these instincts, he demonstrated that health and function are the supreme physical purposes of the human body; in his efforts to protect his women folk from violation, and to maintain an

adequate birth rate, we may discern a deliberate attempt to safeguard the functions of the uterus. He was primarily concerned with the survival of the fittest, his mode of life being incompatible with the survival of unfit or diseased persons, but he was unable to ignore the results of injuries received in combat with wild animals or the sequelae of wounds sustained in battle. His interest in such accidents was stimulated by the fact that they were incurred generally by the youngest, healthiest and most skilful members of the tribe and he was, therefore, compelled to devise some means of overcoming the effects of such disabilities.

Paleolithic man was peculiarly fitted to make simple clinical observations, because he was forced to pay constant attention to his natural surroundings, to keep a constant guard against the attacks of wild animals, and to maintain a daily watch upon the movements of his human enemies. Trained in this hard school where mistakes were always dangerous and frequently fatal, he was essentially a student of nature and a highly trained observer of natural phenomena. He must soon have learned something about anatomy and surgery from his experience of the slaughtering and cutting up of animals and from the study of battle wounds, thus developing a crude technique in which plants and herbs were applied as surgical dressings and hunting knives and war weapons were adapted for surgical purposes. No doubt his first attempts at surgery were limited to the treatment of injuries and were palliative or even ablative in character, but it was clearly quite early in the evolutionary scheme that attention was turned towards the conservation of the normal sexual functions by the performance of surgical operations upon the genital organs. Many of the initiatory ceremonies concerned with puberty are of ancient origin and they are of particular interest to the gynaecologist, because they represent the earliest attempts to influence the fertility of the individual by operative measures and thus may be regarded as the prototype of conservative operations upon the uterus. Moreover, it is interesting to observe that such tribal customs were intended to facilitate and to encourage the sexual and reproductive functions even at the cost of mutilating the structure of the genital organs, and here we discover the earliest acknowledgment of the principle that structure is subservient to function and must sometimes be sacrificed in its interest.

As civilization proceeded and personal and racial survival became more assured, the scope of primitive medicine was enlarged so as to include the simple investigation of disease and the treatment of diseased persons. The habits of mental concen-

tration and watchfulness imposed upon mankind by his pastoral existence would inevitably lead the paleolithic physician to associate the investigation of disease with the study of nature and to base his treatment upon simple and expectant methods. No doubt many of the drugs now in use were employed in prehistoric times and their therapeutic value was at least partially recognized. It is also quite easy to understand why disease and death should come to be associated with the great natural phenomena by which the life and destiny of primitive man were largely governed.

The powerful and inexplicable forces of nature aroused the wonder of savage peoples and formed the basis of those animistic practices which constituted the earliest form of religion. Out of these practices there arose a belief in mystery and magic and the cult of priestcraft. Men qualified for such transcendental office claimed to influence and control the mighty forces of nature and to possess jurisdiction over both the natural and supernatural lives of their clients. The medicine man was one of the earliest and most influential products of human progress, for he combined in his own person the faculties of both priest and physician, and for this reason was respected and indeed venerated by the less gifted members of the community. As the tribal doctor, he was a dispenser of herbs and other medicinal agents and the chief exponent of surgical methods, while in his capacity as priest, he posed as the servant and confidant of the tutelary deity and claimed to have access to secrets and mysteries which were hidden from ordinary mortals. His sacred office gave special sanction to his more human faculties and invested his medical knowledge with a peculiar significance and importance. The respect paid in the first place to the individual was later accorded to the office and thus the profession of medicine became an object of veneration and the practitioner the arbiter of tribal tradition and practice.

In this way, a new element entered the field of primitive medicine, namely the adoption of the empirical method and the establishment of the principle of medical authority. The value of independent thought and research is undeniable, however unorthodox the method or the conclusion may be, and the personal contributions of such original workers as Lister and Pasteur have been immense, but the employment of the empirical method cannot be restricted to the brilliant originality of the man of genius, nor to the valuable work of less brilliant but equally honest men and, therefore, the acceptance of this principle is not free from danger. If personal predilection is to be recognized as a guiding force in medical teaching, then any man may claim

the right to hold and express his own opinions however ignorant or dishonest they may be, and any quack or charlatan may evoke the spirit of empiricism in order to support his theories or bolster up his practice.

We may summarize this survey of the prehistoric development of the conservative method by saying that primitive man introduced four elements into the practice of medicine:

1. Simple sociological measures directed towards the propagation of the race and the conservation of the reproductive functions—the beginnings of preventive medicine.

2. The development of a crude surgical technique for the treatment of injuries, and later, the institution of ceremonial methods for conserving the sexual functions at puberty.

3. Primitive clinical observations and expectant treatment of disease.

4. The introduction of the empirical principle and the establishment of medical authority.

The Effects of Civilization.

The crude methods employed by ancient man were modified and refined by the process of civilization, but, even in the golden age of Greece, the principles of treatment were clearly dependent upon the traditions of the past. The Greeks taught that nature was the great exemplar of health and that the treatment of disease should be based upon the study of nature and the close observation of the patient. They paid much attention to nursing and general supervision, the use of drugs and other simple remedies; they excelled at clinical medicine and are justly famous for the brilliant development of the expectant method of treatment. Moreover the Greek school advanced the art of surgery to a stage far beyond that reached by their ancestors; their surgical methods were not limited to the dressing of wounds and the treatment of injuries, nor were they restricted to ablative operations such as amputation and trephining, but they included the repair of herniae, the surgical treatment of cataract, and the removal of uterine polypi.

But most of their surgery must have been palliative or ablative in character, and it is obvious that little real progress could be made in the direction of conservatism in an epoch which knew nothing of antiseptics and anaesthesia and had little knowledge of anatomy and physiology. The veneration of the Greeks for physical endurance and beauty inculcated a reverence for the

human body which probably explained their reluctance to dissect the human subject, but it is nevertheless very difficult to understand how a race could achieve supremacy in sculpture and devote such ardour to the pursuit of physical perfection as to grant safe conduct to enemy athletes proceeding to the Olympian contests, and yet retain such false notions concerning structure and function.

In addition to their classical contributions to clinical work the Greeks introduced two new principles into the science and art of medicine; Aristotle initiated the experimental method of biological research when he investigated the anatomy of the dog-fish and described the placental attachment of the embryo. Hippocrates and his followers, by instituting the Hippocratic oath, laid it down for all time that the physician must be distinguished by the lofty ethical standard of his professional conduct and that he must consider his primary duty to be the conservation of the life and safety of his patients. The words—"I will give no deadly drugs to any, though it be asked of me, nor will I counsel such, and especially will I not aid a woman to procure abortion"—breathe the spirit of true conservatism and we may well recall them in an age which is confronted with the ethical problems associated with legalized abortion and eugenic sterilization.

The Egyptian school succeeded to the Hippocratic tradition, and in Alexandria was begun the study of those sciences which form the basis of modern scientific medicine. Herophilus in 200 B.C. was the first teacher of anatomy to practise public dissection, while at the same time Erasistratus was laying the foundations of physiological research. The latter is also famous for his contributions to preventive medicine, for he wrote a book on hygiene which enunciated the view that if prevention could be achieved, cure would be unnecessary.

After the decline of the Alexandrian school, Greek culture migrated to Rome. The Romans, as invaders, conquerors and colonists, had little interest in experimental medicine, but they were vitally interested in physical efficiency and with the development of a military and civilian organization competent to preserve the health of the army and the nation.

In addition to building roads, they founded hospitals and devoted much attention to practical sanitation. The Romans were also the first to study the physiological principles underlying the art of midwifery, and they have the right of priority in regard to the organization of a midwifery service, for whereas the Greeks were content to leave normal midwifery to the care of slaves and

women and reserve the attention of their physicians for difficult cases only, the Romans modified this custom by encouraging the practice of midwifery among men midwives. The writings of Celsus, Aetius, Soranus and other writers of this period show that the art of obstetrics had reached a comparatively high level and that conservative methods of treating the pregnant uterus were known and practised during the early part of the Christian era. There can be no doubt that the Roman obstetricians were familiar with the use of nets and fillets, and realized the value of rupturing the membranes, of version, and other simple measures for providing assistance to women in labour.

During the centuries which intervened between the fall of the Roman empire and the sixteenth century, medicine made little further progress, and much of the medical knowledge possessed by the Greeks and Romans was forgotten or remained in abeyance until the revival of learning. It would be a mistake to suggest that Greek culture was entirely lost throughout this period or that the practice of palliative surgery and wise expectancy fell into complete disuse. Proof to the contrary is furnished by the records of the medical school which flourished at Salerno and by the work of the Arabian physicians, of whom Rhazes, Albucasis and Avicenna were famous as obstetricians; but during this period the characteristic method of practice was an empirical one—at its best a feeble imitation of the Greek tradition, and at its worst, a combination of magic and mystery.

And yet the so-called dark ages had their bright intervals, and made two notable contributions towards the advancement of medical science. The monastic orders were concerned with the spiritual rather than the bodily welfare of their patients, but they did in fact establish hospitals and libraries where ancient manuscripts were preserved and copied, and they founded the first universities in Europe which still survive to bear witness to their industry and enthusiasm.

The medievalists also made an important discovery in regard to the control of infection. The mortality which was associated with the Black Death was an appalling commentary upon the state of preventive medicine in the Middle Ages, and yet the town of Ragusa found that it was possible to restrict the spread of infection by compelling strangers to remain outside the city for a period of 40 days (*quarantina*) of isolation. This discovery of the value of isolation established a principle of treatment that is still of vital importance in the twentieth century, and one that has a particular application to the conservation of uterine function.

The Renaissance of Midwifery.

From the obstetric point of view, the Renaissance began with Ambroise Parè, the famous surgeon who re-introduced internal version for the treatment of dystocia. Parè, according to Smellie, was the first to improve upon the teaching of the ancients, and we may acclaim him as the first of the moderns. Prior to his time, the art of midwifery had lapsed into the hands of ignorant women; the conservative methods of treatment employed by the Roman obstetricians had been largely forgotten and medieval obstetric work was limited to the performance of craniotomy and post-mortem Caesarean section. But the fame of Parè does not rest upon the invention of a new method, but rather upon the discovery of a new principle, for he demonstrated that it was possible to preserve rather than destroy the life of the child and the mother in cases of difficult labour, and thus he is clearly entitled to the honour of priority in regard to conservative midwifery.

Parè's work and teaching led to the foundation of the great school of midwifery in Paris, later associated with the names of Mauriceau and Gregoire, and to the appearance of the first textbooks which did much to spread the new teaching and to raise the standard of obstetric knowledge. The discovery of a new method for shortening labour and relieving the suffering of childbirth was bound to create a demand for professional assistance during labour and to encourage the development of a new type of surgeon especially interested in obstetric work. The acceptance of this innovation by the general public was greatly assisted by the publication of the secret of the midwifery forceps which at once gave an enormous advantage to the man-midwife. It became fashionable to call in obstetric surgeons for normal as well as for difficult cases, a custom which enabled the great obstetricians of the seventeenth and eighteenth centuries to study the physiological principles of normal reproduction and to devise those mechanical means of assisting women during delivery which remain in the forefront of conservative treatment of the parturient uterus.

The initiation of conservative surgical methods of treatment may be said to have preceded the Renaissance proper, and to have begun when Simon Nufer plunged his sow gelding knife through the abdominal wall and into the uterus of his courageous and longsuffering wife. The result of this historic operation demonstrated to the world, perhaps for the first time, that a woman suffering from one of the most dangerous

complications of midwifery could not only be cured by an abdominal operation, but that such treatment was compatible with the conservation of the whole of the sex functions of the uterus. It is unlikely that the operator himself was even dimly aware of the significance of this act, although he may have thought himself to be more capable of undertaking the operation than the numerous midwives and other attendants who had failed to achieve the delivery of his wife. As a sow gelder, he must have been familiar with the anatomy of the abdominal wall and the genital organs of those animals upon whom he was accustomed to operate. Very likely he was quick and dexterous and he may have argued that if he could so easily open the abdomen of a lower animal there could be no reason for thinking that the same operation could not be performed on the human female. The immediate result must have been very gratifying to all concerned, and the subsequent history of the patient doubtless surpassed the most sanguine expectations of the surgeon and his assistants. This operation is a striking example of empiricism at its best, because Nufer had not been trained in medicine and his capacity for dealing with the situation was entirely dependent upon his own observations and deductions. At the same time, his occupation as a sow gelder must have provided some insight into the functions as well as the anatomy of the female sex organs, and the result of his sow gelding operations must have impressed him with the fact that function is related to structure.

Nufer's operation was an epic of empiricism and no doubt a very lucky chance, but it was founded upon sound deduction and common sense, and the operator was in a peculiar way qualified to undertake this daring innovation. The successful result marked a splendid finish to an age of empiricism and heralded the dawn of scientific and rational surgery.

The brilliant effort of Nufer and the splendid contribution of Parè were notable preliminary events in the great revival of learning which recaptured the culture of the ancients and set in train those researches into all branches of knowledge which have transformed the world in the course of the last three centuries.

Leonardo da Vinci, anatomist and experimentalist, was the first to correct the erroneous views of the ancients by demonstrating the true structure of the lungs and disposing of the Galenic theory that the pulmonary veins carried air to the heart. His work was continued by Andreas Vesalius who became Professor of Anatomy at Padua at the age of 24, and published

in 1543 his great original work entitled *Fabric of the Human Body*, the quality of which is described by Singer in the following words: "It is a fair statement that the whole of the modern descriptive anatomy may be treated as a comment and correction and amplification of Vesalius."

Physiological research is essentially associated with the work of Fabricius who succeeded Vesalius at Padua and taught in that school for 50 years, and with the immortal name of Harvey who studied under Fabricius in Padua in 1600 and described the circulation of the blood in 1628. This epoch-making discovery revealed the essential unity of anatomy and physiology and it afforded a rational basis for conservative treatment by demonstrating the perfect correlation which exists between healthy structure and normal function. All medical research since the Renaissance has been concerned with the elucidation of the physiological and pathological problems which arise out of this relationship and with the provision of therapeutic measures for the repair of structure and the restoration of function.

It would be impossible to mention a tithe of the great men who, from Nufer and Parè to Pasteur and Lister, have been responsible for the transition in science and medicine, but we may well remember that our own profession has played an honourable part in this process. To-day we may recall with pardonable pride the names of Simpson for his pioneer work in anaesthesia, Semelweiss, Charles Clay and Oliver Wendell Holmes for their great researches into the problem of puerperal sepsis, and of Spencer Wells and Keith, who led the surgical vanguard in the pre-Listerian period which marked the close of the Renaissance.

During this transition period, gynaecology remained in the background of surgery and its practise was confined to the tapping of ovarian cysts, the removal of polypi and the application of various remedial agents to the accessible parts of the genital tract.

At the beginning of the nineteenth century, surgery was still faced with two of the major problems which had confronted the Greeks—the treatment of shock and sepsis. The discovery of chloroform removed one difficulty, but it added to the gravity of the other in so far as anaesthesia inevitably increased the number of operations without doing anything to reduce the suffering and mortality produced by post-operative sepsis and gangrene. It is true that Spencer Wells and Keith had developed a technique which was greatly superior to that of their predecessors, but they did not solve the problem and it remained for Pasteur and Lister to provide the real solution, and with their monumental work

we may justly regard the Renaissance as complete and the modern era as begun.

The Modern Era.

The modern era has been characterized by the development of a surgical technique which has made every part of the human body accessible to the surgeon and amenable to surgical treatment. This technique has also provided a new medium for physiological and pathological research, and directly and indirectly it has been responsible for the discovery of our best methods of conservative treatment; these methods are well known and do not require any detailed description.

The Functions of the Uterus.

Before the results of conservative treatment can be interpreted in terms of uterine function, it is necessary that the functions of the uterus should be discussed and evaluated. These functions are six in number: (1) reproductive, (2) menstrual, (3) sexual, (4) metabolic, (5) psychological, (6) sociological and legal.

Reproductive Function.

Reproduction is the supreme privilege of woman and the main function of the uterus. This capacity is present during a limited period of life, and even within this period, fertility progressively diminishes as age advances and, therefore, the loss of the reproductive function is less serious to a woman of 45 years of age than to a comparable patient who is 10 years younger. And since the exercise of this privilege is restricted to married women, the power of procreation is more valuable to a wife than to a spinster but, nevertheless, the possession of this faculty is of great importance to all women of the childbearing age whatever their age or status may be. In all cases it must be remembered that this function may have been impaired or destroyed by disease before the patient comes under observation and that it is clearly impossible to employ conservative treatment on behalf of a function which no longer exists. In such circumstances the capacity for childbearing must be discounted and attention paid to the possibilities of preserving the subsidiary functions of the uterus and its adnexa.

Menstrual Function.

Menstruation is an essential activity of the non-pregnant uterus

during the epoch of active menstrual life which coincides with the period of childbearing. From the physical and hormonic point of view, normal menstruation exercises a considerable influence upon the general health of the patient, and in addition it has a marked psychological value, in so far as a regular painless rhythm is believed to indicate the presence of healthy sexual and reproductive organs. Serious departures from the normal in regard to menstruation, whether they are the result of disease or the sequelae of treatment, are apt to induce feelings of defeatism and sex inferiority which are injurious to the mental and physical health. Many women dislike the process of menstruation, but are loath to part with it and, although for reasons of pain or excessive loss the patient may be willing and indeed anxious for menstruation to be suppressed, even then the loss of this function is generally regarded as a sacrifice.

Sexual Function.

The presence of the uterus complete in structure and healthy in function is essential to normal sexual relations. The removal of the cervix is stated to diminish the sensitivity of the patient and to induce a degree of frigidity, while the loss of the whole uterus interferes with the act of coitus by reducing the length of the vagina and substituting a fibrous and perhaps painful scar for the resilient and sensitive structures which normally form the roof of the canal. In cases of dyspareunia due to painful retroversion, Gilliam's operation or ventral fixation is obviously a conservative procedure and even hysterectomy may be regarded as conservative in its effect upon the sexual relations when the excision of a tender and functionless uterus removes an otherwise insuperable barrier to intercourse and renders coitus painless. In addition to the physical sequelae of radical operations upon the uterus, hysterectomy has a serious effect from the psychological point of view, since many women believe that the removal of the uterus will unsex or otherwise unfit them for marital relations. The significance and the severity of the psychological symptoms which follow this operation vary in accordance with the nervous constitution of the patient, the extent of the disease and the type of treatment, but they are rarely absent and their importance must never be overlooked. One woman will willingly sacrifice her uterus with all its functions in the hope of being restored to good health, while another will endure almost any degree of discomfort and even pain rather than part with this organ, however damaged and disordered its function may be.

Metabolic Function.

Little is known about the internal secretions of the uterus, but it is universally recognized that in conjunction with the ovary the uterus exerts a profound effect upon the balance of the endocrine system. It has been shown that the functional activity of the gonads and the endometrium are closely correlated and that the menstrual rhythm is determined by the internal secretion of the ovary and cannot continue when that organ is removed. It is also probable that the function of the gonad itself is dependent upon the activity of the endometrium and that withdrawal of the influence of the uterus is followed by disuse atrophy in the gonad. Moreover the operative technique necessary for hysterectomy is apt to inflict injuries upon the vascular supply of the ovary and to induce changes of a mechanical nature (such as cysts or adhesions) which have a directly injurious effect upon the structure and function of the ovary. Hysterectomy is generally followed by menopausal changes sooner or later even when the ovary is conserved or grafted, and although something may be done to relieve such symptoms by suitable hormone therapy, it is at present impossible to eliminate completely the metabolic effects which follow operative removal of the uterus or radiological destruction of the uterine function.

Mechanical Function.

The uterus has close surgical relations with the bladder, rectum, pelvic muscles and other structures, and many operations upon the uterus, conservative as well as radical, disturb these relations by leading to the formation of adhesions between the viscera or by interfering with the integrity of the pelvic floor and its associated ligaments and fasciae.

Uterine Function from the Sociological and Legal Points of View.

From the sociological point of view, the uterus is the source of man power, and as such is of national importance. The interruption of pregnancy and the practice of sterilization imply the inhibition of reproduction and involve a process which differs only in degree from the destruction of function which follows hysterectomy or the employment of radium; it is open to question whether the application of these operations for eugenic purposes has so far yielded any results of the slightest value to the community. It must also be remembered that since the reproductive function is a matter of national importance, the capacity to perform this function is a valuable personal asset to the individual

and conversely that its loss may sometimes be a matter for damages and compensation. In a recent case in Liverpool, an 8-para, 32 years old, eight months pregnant, stumbled while walking along an unfinished road and later sued the Corporation for damages. The patient was delivered prematurely of twins and the labour was complicated by ante-partum haemorrhage and followed subsequently by the symptoms and signs of subinvolution. This condition was treated six months later by the application of an amount of radium which implied the probable loss of the reproductive function. The patient received £375 in settlement of her claim and the legal advisor of the Corporation was well satisfied with this amount, for he feared the learned judge might assess the loss of the reproductive function at a much higher figure.

The General Principles which underlie the Application of Conservative Methods.

1. If the preservation of life is the primary duty of the surgeon, then both structure and function must be sacrificed in the interests of life itself, and the merits of any therapeutic procedure must be judged primarily by the risk which it entails for the patient. It is, therefore, essential that the mortality of every conservative operation should be carefully investigated and recorded. Caesarean hysterectomy, for example, is less conservative than Caesarean section, but, in the presence of severe sepsis or trauma, the retention of the uterus in order to conserve its function may imply a risk which is quite unjustifiable.

2. The choice of method must be considered from the point of view of its effect upon the restoration of function. We must first try to determine the amount and type of function which has been destroyed by the disease and then estimate the possibility of conserving whatever function is left in the affected organ. For example, when serious pelvic infection has destroyed the reproductive function and transformed menstruation into a painful, pathological and perhaps unsupportable process, the only remaining function which is worthy of consideration is coitus, and in such circumstances, even the removal of the uterus may be regarded as a conservative operation if it relieves dyspareunia and restores the sexual function to normality.

3. The conservation of structure is admittedly the least of the three constituent parts of conservatism, but nevertheless it must always be taken into account. So long as the retention of a damaged organ does not increase the immediate risk or prejudice

the future health of the patient, there cannot be any justification for excision on the grounds of loss of function; otherwise it would be necessary to remove every parous uterus after the menopause. The observance of this rule acts as a safeguard against mutilation, for it emphasizes the fact that although structure is subservient to function and must sometimes be sacrificed in its interest, there should never be any unnecessary sacrifice of tissue.

4. Finally the physician should not allow himself to be carried away by personal predilection for a particular procedure, but should cultivate a broad outlook upon therapeutics and should adapt his treatment to the requirements of the individual patient, choosing that method which offers the best functional result with the least risk to the patient and with the minimal sacrifice of tissue. Very often the optimal result means making the best of a difficult situation and a decision as to the best method of treatment can only be reached after a full consideration of the extent of the disease, the severity of the functional failure and the age, status and personal requirements of the patient. For example, myomectomy for multiple fibroids in a recently married woman 40 years old may be followed by the happiest results, but it is open to question whether the additional risk is justified when the patient is unmarried or unwilling to face the prospect of a future operation.

The General Results of Conservative Treatment.

Bearing these principles in mind, we may endeavour to assess the scope of conservative treatment by considering the general value of the methods now available.

Conservatism in Obstetrics.

Among the simple expectant methods of conserving the function of the uterus, the practice of antenatal work in its broadest sense and the use of conservatism in the course of labour must take pride of place, but unfortunately the application of pre-natal care has been restricted to the period of pregnancy alone, and the opinion has gained ground that so long as pregnancy is properly supervised there can be little necessity for special care during labour. The truth is that the antenatal period does not begin at the first visit of the patient to the doctor, nor strictly speaking at the moment of conception, because the size of the pelvic bones, the growth of the uterus, and other factors concerned with reproduction, are determined by influences which arise during the intra-uterine life of the individual and come into action at and after puberty.

Moreover the antenatal period does not end with the termination of pregnancy or with the onset of labour, but continues throughout the act of birth, and is completed only with those final contractions and retractions of the uterus which follow the expulsion of the placenta.

The universal adoption of pre-natal care, conscientiously applied throughout the whole of pregnancy and labour is undoubtedly competent to reduce the maternal mortality and to remove a great deal of that morbidity which at present impairs and even destroys the function of the puerperal uterus. Unfortunately the erroneous ideas which have prevailed in regard to the scope of antenatal work have had very injurious effects upon the practical conduct of labour, for, as a result of the emphasis laid upon the value of the supervision of pregnancy (and the foolish conclusion that under such circumstances labour will not require any supervision) the art of obstetrics has undoubtedly declined and a new race of obstetricians have arisen who regard labour as a surgical operation and Caesarean section as the only means of dealing with any complications which may accompany the act of birth. Happily the recent and increasing popularity of the lower segment Caesarean section has set up a reaction in favour of conservatism by demonstrating that it is possible and indeed advantageous to give the natural powers a fair trial (trial labour) before resorting to surgical delivery.

Maternal morbidity, as distinct from mortality, with which of course it is intimately associated, has become a matter of grave concern to the profession and it has recently attracted the attention of the general public and the Government, who are beginning to realize that the mismanagement of labour is largely responsible for much of that avoidable disease and disablement which forms such a large proportion of gynaecological work. It can hardly be doubted that better midwifery will greatly affect the conservative treatment of uterine function by reducing the amount of puerperal morbidity and thereby rendering any form of remedial treatment unnecessary.

And if these strictures may fairly be applied to antenatal work, they may be applied far more forcibly to post-natal care which has been even more neglected and misunderstood. By common consent, the puerperium is generally disposed of in 14 days, or less, although it is well recognized that a much longer period must ensue before involution can become physiologically complete in a healthy woman. As a result of this misunderstanding, many pathological conditions are allowed to arise in the post-natal

period which may persist throughout the life of the patient, although it is well known that the application of appropriate treatment at the proper time would prevent their development.

Further research, better hospitals, higher standards of medical and nursing education and the cordial co-operation of all the public services are required before the urgently needed reform of antenatal and post-natal care can be accomplished, but there can be no doubt that such an achievement will vitalize the midwifery service and react with enormous benefit upon the health and happiness of the women of this country.

Conservatism in Gynaecology.

As a natural result of the introduction of the antiseptic system of surgery, gynaecological treament became increasingly surgical in its technique and more radical in its method, until it had reached a stage at which expectant therapy was practically non-existent; in the course of this process, pessaries were replaced by plastic operations, and simple types of hysterectomy gave way in favour of the more radical methods which eventually culminated in the Wertheim technique for carcinoma of the cervix. But of recent years a reaction has set in, and the futility of irrational and ablative operations founded upon erroneous views of the causation of pelvic disorders has been generally realized.

The Treatment of Uterine Infection.

For the conservative treatment of infective diseases, truly specific or curative methods have yet to be discovered, and in spite of much immunological research, a great deal remains to be learnt about the fundamental questions of local and general resistance and the virulence of organisms; and until these problems have been elucidated, conservative treatment must continue to be palliative rather than curative. Moreover the peculiar morphology of the genital tract and the inaccessibility of its deeper parts to medicinal agents, the proximity of the bladder and bowel, and the constant presence of organisms in the canals which perforate the pelvic floor, are clinical factors which render any form of treatment both tedious and difficult. Another source of disability in connexion with the control of uterine infection and the conservation of uterine function in the presence of infective disease, arises from the frequent exposure of such patients to the risk of re-infection when they return to their ordinary activities and to the source of their primary infection.

In spite of these handicaps, depletion, rest and simple uterine drainage are still the most successful methods for the treatment of

acute uterine infection, but their employment has a much less satisfactory effect upon the sub-acute and chronic cases. Palliative methods such as the application of heat, diathermy, vaccines and hydrotherapy are competent to relieve symptoms in milder cases, but even here they frequently have little effect upon the restoration of those functions which have been impaired by the infective process. In the most inveterate cases, non-operative methods are rarely successful, and sooner or later it is necessary to substitute radical for conservative procedures if the patient is to be preserved from the evils of chronic ill-health or complete invalidism.

The Treatment of Innocent Tumours of the Uterus.

Conservative methods may sometimes be applied with advantage to innocent tumours, which can be excised without interfering with the structure and function of the uterus; the scope of this method will be considered later.

Mention must also be made of the advantages and disadvantages accruing from the conservation of the cervix when performing the operation of hysterectomy for simple tumours and other lesions in which malignancy can be excluded. There can be no doubt that since carcinoma of the cervix is restricted almost entirely to the parous uterus, the presence of the cervical stump after sub-total hysterectomy is a potential source of future carcinoma, and that on this account the sub-total operation involves some risk to the patient. There are also obvious disadvantages in leaving an infected cervix *in situ* when performing hysterectomy for pelvic infection and on these grounds it has been urged by many influential writers that the sub-total method is a bad one and that it should be given up entirely in favour of pan-hysterectomy.

It must be admitted that there is much to be said for this point of view and that it is unwise, if not unsafe, to perform the partial operation when the cervix is infected or shows changes which are in any way suspicious of present or future carcinoma. At the same time, this principle should not be pushed too far, particularly in regard to the risk of neoplasia, because it has been shown in the most recent paper on this subject that while the incidence of carcinoma is approximately 0.3 per cent, the actual additional risk involved by the performance of the larger operation is about 2 per cent.

If Fahnrich's figures are correct, it would appear that a patient upon whom a total hysterectomy is performed for an

innocent lesion must incur an immediate additional risk of 2 per cent in order to avoid a future hypothetical risk of 0.3 per cent.

In Liverpool, however, the incidence of stump carcinoma appears to be greater than 0.3 per cent and the differential mortality between total and subtotal hysterectomy to be less than 2 per cent, so that our experience suggests that Fahndrich's deductions from mass statistics must be accepted with some reserve.

The Treatment of Malignant Disease of the Uterus.

Conservatism has so far played little if any part in regard to the control or cure of malignant disease, although it is stated that the practice of pre-natal care has reduced the incidence of carcinoma in those clinics which have devoted special attention to the repair of cervical injuries sustained during labour.

But so long as the pathogenesis of cancer remains unknown it must be impossible to prevent the onset of this disease or to employ rational measures for its control and treatment. At present specific methods are not available and the best results are due to the employment of radical methods at the earliest possible moment, preferably during the pre-malignant stage of the disease. When dealing with pre-cancerous or doubtful lesions, procrastination may be fatal to the patient, and for this reason expectant treatment must be very carefully controlled when it is being used for conditions which are in any way suspect of malignancy.

It would be impossible to pass over this subject without some reference to the brilliant investigations of the late Professor Blair-Bell and his fellow-workers into the aetiology and treatment of cancer. These researches have shed a new light upon this dark and difficult problem, and they have led to the discovery of a form of treatment which may some day prove to be the basis for a curative and conservative method of dealing with malignant disease.

The Treatment of Uterine Displacements.

The post-war period has seen an increase in the number of operations performed for prolapse of the uterus with a corresponding improvement in the functional results of such treatment, and the same period has witnessed a marked diminution in the number of the operations which were formerly undertaken for the treatment of retroversion. Both these changes must be regarded as conservative in the best sense. In the first place the Manchester operation for prolapse has greatly extended its scope

and influence, because it has been found to be free from risk, curative in regard to the mechanical defect, and at the same time conservative in its action upon the function of the genital tract. And secondly, the tendency to discard operations in favour of expectant methods for the treatment of retroversion is a conservative movement of the most necessary kind, because it implies a declension of a type of operation which has been performed far too readily in the past.

New Methods in Gynaecology.

Surgical methods have declined in number for a more reputable reason than the mere suppression of unnecessary operations, namely on account of the discovery of better methods, such as radium and X-rays, which have largely displaced hysterectomy in the treatment of intractable uterine haemorrhage, and have undoubtedly reduced the mortality which was previously associated with such diseases. X-rays and radium therapy may rightly claim to be conservative in type from the point of view of structure, but it must be remembered that the gamma-rays set up destructive tissue changes which inevitably impair and sometimes destroy the menstrual, reproductive and metabolic functions of the uterus. Such effects are admittedly negligible when malignant disease is in question, but they assume a serious importance when radium is applied for the relief of simple functional disturbances in young women, and they will, therefore, be considered more fully later.

Hormones have attracted much attention for a considerable time, but they are still regarded with suspicion by many clinicians; happily the old days of blind empiricism have given way to a more enlightened epoch in which the therapeutic application of these substances has been placed upon a rational and scientific basis through the medium of much valuable research into the physiology of the endocrine system and its influence upon the sex organs. Sufficient progress has already been made to warrant the hope that hormone therapy will soon replace radium and X-rays for the treatment of many functional conditions of the uterus and will render surgical methods obsolete.

The Empirical Method in Gynaecology.

In spite of all our modern researches, many pathological problems remain unsolved and we are compelled to fall back upon empirical methods.

We are still unable to control the spread of infection or to

promote a physiological type of healing in tissues recovering from inflammatory reaction. The nature of intractable uterine haemorrhage is still obscure in spite of the interesting work on hormone therapy, and it remains to be shown how much can be achieved by this method.

It is difficult to treat dysmenorrhoea on a rational basis, because the sources of uterine pain are largely unknown. The routine employment of many operations such as dilatation for dysmenorrhoea, and curettage for endometrial thickening, the exhibition of hormones for uterine malfunction, and the use of serums for the control of infection are frequently carried out on purely empirical grounds.

It would be foolish to suggest that empirical methods are necessarily unsatisfactory, indeed it is obvious that much of our best treatment is empirical in character and that it is bound to retain this quality so long as our knowledge of the natural history of disease remains incomplete; but it would be equally foolish to shut our eyes to the fact that claims are made on behalf of new remedies, and new operations, by those who introduce them which are not substantiated by the subsequent experience of other less prejudiced observers.

The enthusiasm displayed for Apostoli's electrical methods, the application of *accouchément forcé* for the treatment of eclampsia, and the success of Potter's advocacy of internal podalic version, demonstrate that irrational and even dangerous forms of therapy may enjoy a short-lived fame or rather notoriety, and show that we are just as credulous as our predecessors and almost as prone to mistake propaganda for proof, and to confuse fact with fancy.

This paper upon the general results of conservative treatment of the uterus has been written in conjunction with the work of four colleagues who have devoted their attention to the study of four particular problems, namely myomectomy, endocervicitis, radium treatment for intractable bleeding, and hormone therapy. Individual contributions incorporating the results of these investigations were presented to the British Congress of Obstetrics and Gynaecology at Belfast, in April 1936, by Dr. A. A. Gemmell, Dr. S. Herd, Mr. P. Malpas, and Dr. T. N. A. Jeffcoate.

We desire to express our most grateful thanks to the distinguished gynaecologists throughout the world who have answered our *questionnaires* and favoured us with their personal com-

munications. We are also indebted to many of the Fellows and Members of the British College of Obstetricians and Gynaecologists for their advice and help, and we gladly acknowledge a special debt of gratitude to our colleagues in Liverpool for their generosity in placing their clinical material at our disposal.

[*The discussion on this subject at the Congress of Obstetricians and Gynaecologists at Belfast is on page* 764.]

The Radiumhemmet Method of Treatment and Results in Cancer of the Corpus of the Uterus.

BY

J. HEYMAN, M.D., Stockholm.

From the Gynaecological Department of the Radiumhemmet, Stockholm, Sweden.

MORE than twenty years have passed since the first attempts were made at the Radiumhemmet in radiological treatment of cancer of the corpus of the uterus.

Twenty years is a very short time in which to bring together a sufficiently large series of cases of carcinoma of the corpus to allow of a statistical evaluation of the result of a certain treatment, particularly if the appraisal is to be based upon an observation period of at least five years. This is especially true in the case of radiological treatment, because only during the last decade have any great number of cases of corpus carcinoma been referred to the radiologist.

However, the very fact that more and more cases of this type are coming for treatment impels us to try to obtain a clear conception of the possibilities of radiology in this connexion.

In a number of previous papers I have presented a rough summary of our results from time to time. Only in the last ten years, however, has our material become large enough to justify a more detailed analysis. When we began this investigation seriously six or seven years ago we encountered certain difficulties which forced us to revise carefully each individual case-record and to take a definite stand in regard to certain problems related to statistics on corpus cancer.

These problems may perhaps seem to be unessential and of little interest. According to our experience, however, they cannot be disregarded if we wish to arrive at an exact conception of the value of our therapy and still less if we wish to compare our results with those of others. Let me give an account of the difficulties which we have encountered and the way in which we have dealt with them. I shall be very glad if my report gives rise to a discussion of these questions.

The first question is that of how can one distinguish corpus cancer from the other forms of uterine carcinoma?

As I pointed out at the Fourth International Radiological Congress in Zürich in 1934, there exist a considerable number of cases in which cancer can be histologically demonstrated in both cervix and corpus. This circumstance has been pointed out by Schottlaender and Kermauner,[1] and by Taylor.[2] With few exceptions we find such cases among the adenocarcinomata. They are usually advanced carcinomas involving the entire uterus (about 50 per cent of our cases). Sometimes, however, they are apparently early cases without palpable changes (about 25 per cent of our cases). For many years at the Radiumhemmet all cases of uterine cancer which are not immediately clinically classifiable as cervical carcinoma have been submitted to a fractional curettage. After curettage of the cervix, material is removed from the fundus with forceps, the isthmus and, finally, the corpus are curetted. Probably because of the special attention which we give this point such cases have been increasing in our series year by year.

It is a fact that it is frequently impossible to place these cases in one or another of the two conventional groups—as carcinoma of the corpus or of the cervix—without violating the diagnosis and, therefore, it is highly desirable to reach an agreement as to how they should be classified. The possibility of comparing different statistics on corpus cancer will be detrimentally affected if one clinic places this group with the corpus and another with the cervical cancers. Until an agreement has been reached we are listing them separately under the heading *carcinoma corporis et colli uteri*.

Cases with cancer in both uterus and ovaries provide another group which is difficult to classify. Here also it would be a violation of the diagnosis if we referred these cases to either corpus or ovarian carcinoma, so we keep them in a separate group which we call cancer of the uterus and ovaries.

The second question concerns that of the histological diagnosis. It is well known that one of the most difficult problems for the pathologist is the diagnosis of cancer from curettings, and that even among expert pathologists there is a variation in the requirements for a positive diagnosis.

International uniformity in the making of diagnoses is desirable but at present unattainable. Local uniformity should be achieved, however, in the individual clinic. This requires that the clinic should have access to the histological preparation in every instance. Nowadays we follow the rule of including in our statistics only those cases in which the histological diagnosis

has been verified by the chief of our own pathological department.

When uncertain, many pathologists prefer to report cancer, and most radiologists in such a case would probably submit the patient to treatment, thus giving her the benefit of the doubt. It is these histologically doubtful cases, more than anything else, which bring about the lack of uniformity in the initial material and the consequent difficulty in the comparison of statistics.

Such cases should, therefore, be placed in a group by themselves so that they can be easily included or excluded according to convenience. We ourselves follow this principle, registering such cases as "probably cancer."

Moreover, since 1929 we have divided our material into a number of groups according to histological structure. Our system of classification has been worked out by our pathologist, Dr. Reuterwall. I shall not go into further details on this point as the histological aspect does not influence our mode of treatment.

The third question, which patients should be counted symptom-free at the end of the five-year period, is perhaps the most difficult. If we make it a rule to count as clinical cures only patients who are both subjectively and objectively symptom-free, then the diagnosis of freedom from symptoms must be based on clinical examination and not on oral or written reports from the patient or relatives. As we all know, it is not unusual for a patient with corpus cancer to feel absolutely well for months, or years, in spite of the presence of a clinically definite cancer.

If we were to estimate the permanent cure at the end of 10 instead of five years, the doubtful cases would be considerably reduced, but the advantage would be questionable because of the increasing number of deaths from intercurrent disease.

On the other hand, if a patient, with or without repeated treatment, has felt healthy and has been able to work for many years, it would not be correct to register the case as a radiological failure because she may have had minor haemorrhage perhaps years apart.

To me the most practical way is to include among the successfully treated those who feel well, are able to work, and if examined do not present any palpable changes due to cancer. This procedure allows of a good deal of subjective interpretation but it supplies us with the chief facts of the patient's condition, at the same time securing the possibility of comparable statistics.

In the following survey of our results, cases of *carcinoma corporis et colli* and of *carcinoma corporis et ovarii* are excluded,

and only those cases are included in which our own pathologist has verified the diagnosis. Cases registered as "probably cancer" are, however, included.

At the Radiumhemmet from 1914 to 1935 inclusive we have treated 460 cases of cancer of the corpus uteri. The material from 1914 to 1930 inclusive, i.e. cases which have been observed five years or more, is submitted in Table I.

TABLE I.

Total number of patients treated	224
Examined with a view to treatment, but not treated	8
	232

Table II shows the five-year results of the treatment.

TABLE II.

The five-year result in cancer of the corpus uteri at the Radiumhemmet, 1914–1930 (inclusive).

Total number of patients examined ...	232
Symptom-free after five years	98
Absolute cure-rate, 42.2 per cent.	
Number of patients treated	224
Symptom-free after five years	98
Relative cure-rate in patients treated, 43.7 per cent.	

A 42.2 per cent five-year cure-rate is what we have actually achieved by our treatment which has been mainly radiological but combined with surgery in case of failure of the radiotherapy, the result being calculated on the total number of cases examined.

The results in radiological treatment only, i.e. when the cases operated upon are counted as having died of cancer on the day of operation, is shown in Table III.

TABLE III.

The five-year result in cancer of the corpus uteri at the Radiumhemmet, 1914–1930 (inclusive), with radiological treatment only.

Number of patients treated	224
Symptom-free after five years	74
Relative cure-rate in patients treated radiologically only, 33.0 per cent.	

If the result is calculated similarly, except that those registered as "probably cancer" are excluded, the figure becomes 29.7 per cent.

Our material includes operable and inoperable cases. The operable cases are divided into clinically operable and technically operable. By technically operable we understand those which could be operated upon so far as the anatomical extent of the tumour is concerned but the presence of complications such as adiposity, old age, and disease in other organs makes the patient a poor surgical risk.

The distribution of the cases in these groups is shown in Table IV.

TABLE IV.

Grouping of the corpus cases, 1914–1930 (*inclusive*).

Clinically operable	85	(37.9 per cent)
Technically operable	100	(44.6 ,,)
Inoperable	39	(17.4 ,,)
	224	

The result of the treatment in each of these groups is given in Table V.

TABLE V.

The five-year result in the different groups of corpus cancer at the Radiumhemmet, 1914–1930 (*inclusive*).

	Number treated	Number of five-year cures	Cure (per cent)
1. *Patients operated upon included:*			
Clinically operable	85	47	55.3
Technically operable	100	41	41.0
Inoperable	39	10	25.6
2. *Patients operated upon excluded:*			
Clinically operable	85	35	41.2
Technically operable	100	30	30.0
Inoperable	39	9	23.1

A summary of our results from the year 1914–1930 inclusive appears as follows:

	Per cent
Absolute cure-rate with radiological treatment, including patients operated upon in case of failure	42.4
Relative cure-rate in clinically operable cases	55.3
Relative cure-rate in technically operable cases	41.0
Relative cure-rate in inoperable cases	25.6

It is a very difficult task to compare these results with those of operative therapy. To begin with it is difficult to select a non-challengable figure representing the average result in operative treatment. The results presented by different authors vary considerably. The absolute cure-rate varies between 25 and 60 per cent and the relative between 30 and 85 per cent. If we follow what seems to me the correct procedure and take into consideration only those statistics which include 50 or more cases and from which the final result can be arrived at without any subtraction for primary deaths, patients lost sight of, intercurrent deaths etc., there remain only a few statistics which can be used.

Absolute cure-rate in operative treatment.

		Cases	Cured	Per cent
Wilson,[5] Birmingham, 1914 ...	1896–1909 (13 yrs.)	50	12	24
Mayer (Pfleiderer[6]), Tübingen, 1931	1902–1923 (21 ,,)	216	85	39.4
v. Franqué (Haupt[7]), Bonn, 1932	1912–1926 (14 ,,)	72	44	61.1
	Total	338	141	41.7

Relative cure-rate in operative treatment.

		Cases	Cured	Per cent
Taylor[2] (Roosvelt Hospital), New York, 1931	1910–1925 (15 yrs.)	50	16	32.0
Mayer (Pfleiderer[6]), Tübingen, 1931	1902–1923 (21 ,,)	176	85	48.3
Stacy[8] (Mayo Clinic), Rochester, 1929	1907–1923 (16 ,,)	333	184	55.3
	Total	559	285	50.9

Our difficulties increase when we begin to select the figures most suitable for comparison.

If we chose the absolute cure-rate as a basis for the comparison of operative and radiological results, the serious objection can be raised that the initial material is not uniform, for the radiological series consist for the most part of inoperable cases or those unsuitable for operation (in our series 61 per cent), whereas the opposite is true of the surgical. On the other hand we must consider the large group of technically operable cases most of which never come to surgical treatment, but which provide radiology with great opportunities. A comparison of our 42.2 per cent result and the 42 per cent result of surgical treatment does not therefore provide any real information.

Comparison of the results within the group of clinically operable cases should be more significant were it not that the radiologically treated material is still too small for statistical analysis. Surgery has approximately a 50 per cent five-year cure while our corresponding figure with mainly radiological treatment is about 55 per cent, and with radiological treatment alone about 41 per cent.

Conclusions from these figures must be drawn with the greatest care. The future will perhaps provide larger operative and radiological statistics where uniform principles have been adhered to especially in regard to the histological diagnosis, and then we may be able to arrive at a more definite verdict. At present however, this is not possible.

I have tried another way to find an answer to the question of operative *versus* radiological treatment in operable cases by comparing our clinically operable cases chiefly radiologically treated with our own cases which were operated upon and submitted to post-operative treatment. In each series the cases are equally carefully selected, both clinically and so far as the histological diagnosis is concerned. The material is not absolutely uniform. Before the operated cases come for radiotherapy, there has been automatic elimination of the primary deaths, of those which turned out to be inoperable at operation and of those which could not be referred for treatment because of complications in connexion with the operation. In spite of this a comparison seems to be of interest.

From 1914 to 1930 inclusive, 63 cases of corpus cancer have been referred to the Radiumhemmet after radical operation and have been submitted to post-operative radiation. Fifty of these patients were alive and sympton-free five years after treatment

thus giving a five-year cure-rate of 79.4 per cent. This figure is remarkably high. It is probably accidental that among so many elderly patients, only three have died of intercurrent disease. In any case the cure figure for these post-operatively irradiated is nearly twice as high as for those mainly radiologically treated.

In this I find further support for our old standpoint that cases of corpus cancer suitable for operation should be operated upon. Meanwhile we must try to obtain better results in radiology by improving our methods of treatment. The technically operable cases provide us with sufficient opportunity in this respect.

I shall not describe in any further detail the method of treatment which has been used in most cases reported in this paper. Until 1929 we introduced into the uterine cavity a radium tube containing between 35-45mg. Ra element, the length of the tube varying according to the length of the intra-uterine cavity. In two treatments at a three weeks' interval altogether 3,000 mg. element hours were given. One or both of the uterine applications were combined with a vaginal application to prevent vaginal metastasis.

This method has proved suitable for small uterine cavities and we still use it in such cases. It is not appropriate in an enlarged and irregular uterine cavity. In some of our radiologically treated cases which we have operated upon later on account of failure, we have observed that the cancer was healed in the lower portion of uterus, but that a small focus remained at the top of the otherwise narrow cavity. This indicates that part of the tumour has been too far away from the radium and has therefore received insufficient radiation.

Sampson[3] has made similar observations on uteri removed at operation. R. W. Johnstone[4] makes the statement "Radium has less scope here because of the difficulty of being sure that the radium is applied to the diseased area."

Since 1929 we have gradually elaborated a method for the intra-uterine application which seems to us to provide better possibilities for a homogeneous irradiation of an enlarged and irregular uterine cavity. Instead of introducing only one narrow and powerful tube regardless of the size of the intra-uterine cavity we are now packing the uterus with less powerful tubes sufficient in number to get the cavity entirely filled up.

Leaving aside the different problems involved I shall confine myself to a brief description of this method of packing.

In the beginning I packed the uterus with tubes of different sizes and different radium content carried in a couple of metal

cylinders of different sizes, varying the applicators and quantities of radium according to the size of the uterus in the individual case. Nowadays we use uniform 8 mg. radium tubes, 20 mm. in length, with an outside diameter of 2.8 mm. and with a wall-thickness equivalent to 1 mm. of lead. These tubes are each placed in a separate small lead capsule, the thickness of the wall of which is equivalent to 2 mm. of lead.

When making our first attempts with this method we found that in most cases the uterus was well filled with 8–12 cylinders while in the other instances we could insert 20 or more without the cavity becoming completely filled. These great variations in the quantity of radium used led to great variations in the treatment time. Our next step in the direction of standardizing the method was to apply a fairly equal number of tubes in each instance irrespective of the size of the cavity. Instead of increasing the number of tubes we put each lead cylinder in a capsule of porcelain, the size of which varied according to the space available.

The clinical development of the method was preceded by a series of physical experiments which were intended to study the intensity distribution in the uterine wall with different packs, and to determine the time of irradiation required to obtain the same physical dose in different instances.

The procedure was as follows. We prepared a number of leather bags shaped like a uterus with a thin metal band providing a certain stability. The bags were of different sizes. The smallest ones held six tubes, each in a lead capsule. The largest held 20 lead capsules which were in addition surrounded by a $4\frac{1}{2}$ mm. cover of a substance of an atomical weight such that its filtration of the γ-rays could be disregarded.

Various experiments were now carried out. In one series six to 12 lead cylinders without a covering were employed, in a second eight to 12 with a covering of $1\frac{1}{2}$ mm, in a third eight to 12 cylinders with a covering of 3 mm and finally eight to 20 with a covering of $4\frac{1}{2}$mm. For each experiment a bag of suitable size was selected.

The bag was considered to represent the uterine cavity. Our object was to measure the distribution of the intensities on the supposed external surface of the uterus. By comparing several anatomical specimens of carcinomatous uteri we adopted 15 mm. as the average thickness of the uterine wall. The measurements were carried out with the Sievert Condenser Chambers. These are ionization chambers invented by our chief physicist Dr. Sievert

for the measuring of γ-rays. We used spherical chambers with a diameter of 10 mm. A suitable number of the chambers were placed in tandem inside a silk tube which had wound round it a string of wooden beads each 10 mm. in diameter. The silk tube with its chambers and wooden beads was placed in one experiment along the metal band of the bag and in another at right angles. The distance from the centre of each chamber to the surface of the bag thus became 15 mm. (Fig 1.)

After the chambers were irradiated for a suitable length of time determined at preliminary experiments, the tube was removed and the radiation dose was measured by placing the chambers one after another on an electrometer.

Sixteen differently packed bags were examined by this method. In each instance eight to 12 chambers were exposed four to eight times, making a total of 1,000 readings.

These measurements gave us the intensities on the external surface of differently packed uteri of various sizes. From these intensities we have been able to calculate the time of treatment required to obtain an equal dose in the different instances.

TABLE VI.

Treatment-times at intra-uterine treatment with a varying number of 8 mg. tubes in coverings of varying thickness.

The calculation of the time is based on a normal value of 1,500 mg. radium element hours for each of two treatments when using 10 tubes in lead cylinders without an extra covering.

Number of tubes	Hours of treatment			
	Lead cylinders without a covering	Lead cylinders with a covering of 1½ mm.	Lead cylinders with a covering of 3 mm.	Lead cylinders with a covering of 4½ mm.
5 ...	25¼	—	—	—
6 ...	23½	—	—	—
7 ...	22	—	—	—
8 ...	20¾	25	28	32¼
9 ...	19¾	23½	26¾	30¾
10 ...	18¾	22	25½	29½
11 ...	17¾	20½	24¼	28
12 ...	17	19¼	22¾	26½
13 ...	—	—	—	25¼
14 ...	—	—	—	24¼
15 ...	—	—	—	23½
16 ...	—	—	—	22¾
17 ...	—	—	—	22
18 ...	—	—	—	21¼
19 ...	—	—	—	20¾
20 ...	—	—	—	20½

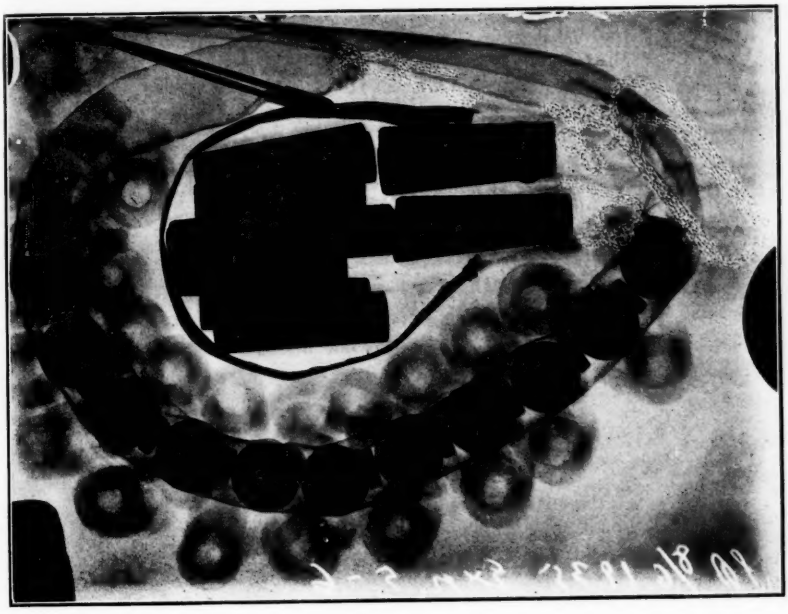

FIG. 1.

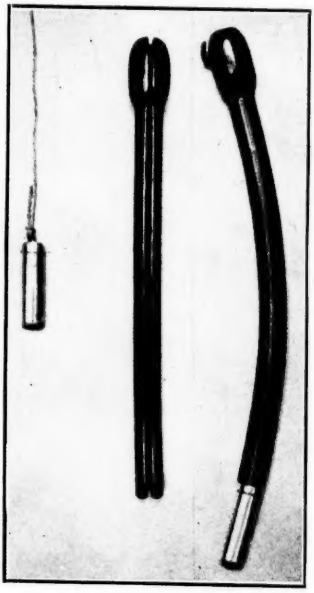

FIG. 2.

On the basis of previous empirical experience we have adopted a dose of 1,500 mg. el-hrs. given twice at a three-weeks' interval as the most suitable when applying 10 tubes each containing 8 mg. Ra-el in metal cylinders without a cover. Starting with this figure it is possible to calculate the time of treatment required for each of the other ways of packing which had been investigated.

Dr. Benner of the Physical Department has made the measurements and calculations which he has summarized in Table VI, which makes it possible to read off directly the treatment time for each of the arrangements of the packs.

The technique of treatment is briefly as follows. After carefully cleansing the vagina and external os, the cervical canal is curetted. Then follows the passing of the sound, the dilatation of the cervix and the examination of the corpus uteri. These manipulations enable us to estimate the width of the uterine cavity and to determine what size of applicators should be chosen in order that the cavity will be sufficiently filled. The diameter of the cervical canal must naturally be considered.

The applicators are introduced into the uterine cavity one after the other by means of an instrument constructed by Sievert. (Fig. 2.) A certain amount of experience and great caution is required in order to pack the uterus. The necessary training, however, can only be acquired at the operating table . According to our experience there is not any great danger of perforating the uterus when packing. In removing the radium difficulties may be encountered which are, in most instances, due to a contracted cervix. In order to prevent contraction it is suitable to place in the lower cervix an applicator which is at least as voluminous as the largest of those introduced higher up. Each metal cylinder has to be provided with a thread. The threads of the last and second last cylinders should be marked so that the cylinders can be removed in the right order. Finally the threads must be strong. Benner has tested threads of different manufacture. Irish linen thread which Dr. Rankin has kindly procured from Messrs. William Barbour & Son, Lisburn, has proved to be the strongest.

The method of packing has not yet been worked out in every detail. For instance, the porcelain capsules are not suitable and we are at present trying to find some other sterilizable material with a slippery surface which can be made sufficiently thin without becoming friable.

The principles mentioned above have been gradually applied at the Radiumhemmet in a systematic way only since 1930. Thus there are no five-year results available for comparison with those

obtained with our previous method of treatment. We shall probably have to wait for at least five more years before we shall be able to present statistics on final results based on a sufficiently large number of cases.

The preliminary results which we have so far obtained seem however to be favourable, as shown by Table VII.

TABLE VII.

Cancer of the corpus. Radiological treatment only. Comparison of primary results obtained in 1914–1930 (*inclusive*) *with those obtained in* 1930, 1931, 1932, *and* 1933.

	Cure per cent after				
	One year	Two years	Three years	Four years	Five years
1914–1929 (inclusive) ...	61.9	48.1	40.9	37.0	33.1
1930	55.8	37.2	37.2	32.6	32.6
1931	58.6	55.2	51.7	51.7	—
1932	77.4	66.0	54.7	—	—
1933	70.6	64.7	—	—	—

You will find that the four-year result in cases treated 1931, the three-year result in cases treated 1932, and the two-year result in cases treated 1933 are considerably better than that previously obtained.

These preliminary results have encouraged further attempts to develop the method of packing. A definite verdict as to its value must, however, be postponed until further experience has been acquired.

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[*The discussion on this subject at the Congress of Obstetricians and Gynaecologists at Belfast is on page* 767.]

Reconstructive Pelvic Surgery for Genital Prolapse. An Evaluation of Principles.

BY

GEORGE GRAY WARD, M.D., F.A.C.S., New York.

AT the November meeting of the London Obstetrical Society in the year 1865, Dr. J. Marion Sims, founder of the Woman's Hospital in New York, had the honour of presenting a paper on procidentia before that distinguished gathering.

Now, more than 70 years later, through your kind invitation, I have the great privilege and honour of addressing my British colleagues on the same subject as my illustrious predecessor.

Sims presented his operation of narrowing the vagina by uniting a V-shaped denudation of the mucosa of the anterior vaginal wall so as to diminish its capacity and to form a column of cicatrical tissue for the support of the uterus and bladder. In the discussion which followed, Spencer Wells called attention to the fact that constricting the vagina for this purpose was suggested by Marshall Hall of London and executed by Heming in 1831. It had also been done in Germany, but it had fallen into disuse until revived by Sims in 1856.

It seems strange that after a period of 70 years, during which there have been such great advances in anatomical knowledge and technical procedures in gynaecologic surgery, that there should still be diversities of opinion as to the principles involved and the best operative technique for the cure of genital prolapse. Yet that this is so is evident from the numerous writings which have continued to appear in uninterrupted succession almost from the time of Hippocrates who wrote extensively on procidentia.

This is proof of the fact that genital prolapse is a many sided complex problem with varying conditions which have to be met and treated according to the existing circumstances. As Victor Bonney has recently written, "no operative treatment is ideal which does not take into account and rectify, or abrogate, all the factors responsible for the particular deformity and that, therefore, no one procedure is a panacea for all cases."

I am in entire accord with Bonney's statement, and while I have not any new operations to advocate, I wish to stress my

belief that having a correct understanding of the principles involved, operative procedures should be selected which will be most suitable to correct the particular lesion, or lesions, in each individual case, thus recognizing the variability and the multiplicity of the types of prolapse which may be present.

The term genital prolapse includes that which we recognize as urethrocele, cystocele, rectocele, enterocele and prolapsus uteri of various degrees. All will agree that these conditions constitute a true hernia of these viscera as a result of a failure of their supporting mechanism, and that this is due to injury, or stretching and attenuation of the fascial and muscular components.

As these herniae are usually associated in varying degrees it is necessary that they be discussed together.

Anatomy.

A review of the supporting structures of the pelvic organs as generally accepted by the majority of anatomists and gynaecologists of to-day will be of value in clarifying our subject. The dissections of Halban and Tandler, Eduard Martin, Poirier and Charpey, Testut and Jacob, Frank, Farrar and Davies of the Woman's Hospital, and Fothergill's contribution on "The Supports of the Pelvic Viscera" in 1907, with a host of others, have placed the subject on a sound basis. The fundamentals are readily understood, if not obscured by complicated descriptions and anatomical terminology.

Briefly we may say that the pelvic outlet is closed by the pelvic diaphragm consisting of two layers of muscles and fascia. The superior is composed of the levatores ani and the coccygeus muscles and their fasciae, the inferior includes the muscles of the vulva and anal region with their fascial attachments and the triangular ligament. Above this pelvic diaphragm there is a third plane of fibromuscular and connective tissue which was first designated by Polk of New York as the "upper pelvic floor." This upper pelvic floor may be described as consisting of three portions all radiating from the isthmus of the uterus and the upper part of the vagina to the pelvic walls. They are first the pubocervical ligaments, a fascial membrane extending from the pubis to the cervix at the level of its junction with the uterus. These fibres blend with the fasciae propiae of the bladder and the vagina and are fused into the anterior portions of the cardinal ligaments. Second, the cardinal ligaments situated in the base of the broad ligaments below the uterine artery, also known as the

transverse cervical ligaments of Mackenrodt. These strong bands of fibromuscular tissue radiate in a fan-shaped manner to the lateral and posterior pelvic walls. Fused with them at a lower level are similar structures attached and fixing the lateral vaginal fornices and upper vaginal wall. The third portion, consisting of the utero-sacral ligaments, divides to encircle the rectum, and extends from the cervix backward to be attached to the sacrum in the region of the third and fourth sacral vertebrae. At the cervical junction of these three divisions of this fibromuscular diaphragm, these fibres are intimately fused together, and thus all form a part of the structure which is the real support of the uterus, bladder and vaginal vault. This has been aptly termed the "holding apparatus" by Frank of New York, who has made valuable contributions to the study of prolapse from its clinical aspects. Bonney has described it as the "pelvic shell", and stresses the fact that these structures form more or less a continuous sheet. This upper pelvic floor fixes and holds the cervix in position, and may be likened to an elastic hammock or sling, and is the main support of the uterus.

The lower pelvic floor, or diaphragm, consisting of the two muscular and fascial layers previously referred to has been described by Frank as the "supporting apparatus", and is accessory in its action to the "holding apparatus" above, and in response to voluntary contraction, acts as a shock absorber of excess stress —the result of increased abdominal pressure. Its tonicity also gives a continual support to the upper pelvic floor.

Chipman, of Montreal, has aptly compared this support mechanism to a "person sitting in a swing, steadied therein above and with a definite foot rest below."

The upper portions of the broad ligaments, with the enclosed round ligaments, have little or no actual supporting function, but merely steady the fundus uteri. In other words, they act as guy ropes, the round ligaments limiting the backward movement of the uterus.

Normally the uterus lies in an anteverted position and at right angles to the axis of the vagina, thus the genital canal is curved, and the intra-abdominal pressure is exerted on the posterior surface of the uterus, thus forcing the uterus forward. In prolapse of the uterus, this organ becomes retroverted as it follows the curved canal in the course of its descent.

Dickinson's study of Halban's and Tandler's 33 remarkable plates of genital prolapse called attention to the transverse planes of cleavage in the pelvic diaphragm, down which a hernia may

glide. These planes of cleavage are four: the post-pubic, the urethro-vaginal septum, the recto-vaginal septum, and along the anorectal canal. The segments which may slide downward along these cleavage lines are in consequence four; the urethral, the vaginal, the perineal, and the recto-anal segment.

Trauma injuring the fascial supports may cause any of these segments to slide downward along these cleavage planes, either singly or in any combination. Prolapse of the vaginal segment is the most common in the more extensive cases, usually the anterior vaginal wall with the attached bladder, as it has the poorest support. The perineal segment is displaced more often than any other in the cases of lesser degrees, as a result of the injuries of childbirth. The recto-anal segment is the least commonly displaced.

The injuries directly concerned with these cleavage planes are urethrocele, cystocele, rectocele, enterocele and elongation of the cervix. There may, or may not, be an associated prolapse of the uterine body. Prolapse of the uterus occurs only with injury of the structures of the upper pelvic floor, although usually associated with tears of the pelvic diaphragm below. In rare cases nulliparae with congenitally defective tissues, or those having neoplasms causing increased intra-abdominal pressure, may develop prolapse.

Principles of Repair.

Recognizing that prolapse of these various viscera is in the nature of true hernia, the accepted principles for the correction of herniae in other parts of the body apply equally here. The protruding viscus must be first replaced, and repair of its damaged supporting fasciae must be accomplished.

It is essential that whatever operative technique is employed, the uterus must be maintained in its normal anteverted position, so that the axis of intra-abdominal pressure is correctly directed. If the uterus is retroverted the intra-abdominal pressure will fall on the bladder and anterior vaginal fornix, tending to produce a hernia. With the anteverted uterus it is deflected posteriorly, and only when pressure is excessive and the supporting fasciae of the rectum and vaginal wall are weakened, will it cause a hernial protrusion of the pouch of Douglas in the cleavage plane between the rectum and the posterior vaginal wall.

Relaxation of the pelvic diaphragm, caused by lacerations of the levatores ani, their fascia, and of the trigonum, results

in inability to close the vaginal introitus. This crippling of the supporting apparatus causes a loss of support to the vaginal walls and the uterus, and if the fasciae of the bladder and rectum and upper pelvic floor are injured, the production of hernia is favoured. As the vaginal walls descend and turn outward, dragging down the bladder and rectum, they also make traction on the cervix, which may thus be elongated with or without an associated prolapse of the body, depending upon whether the upper pelvic floor has been damaged. Repair of this supporting apparatus, or pelvic diaphragm, restoring the normal shape of the vagina, and the ability to close the vaginal outlet is an essential part of all operations for genital prolapse.

Urethrocele.

The urethra is attached to the pubis, the subpubic fascia and the anterior vaginal wall. If torn from its attachments this urethral segment slides down the post-pubic and urethro-vaginal planes of cleavage, and the injury to the sphincter urethrae results in "stress incontinence." This incontinence of urine under strain is a common condition associated with these injuries, and should always be inquired for, as patients frequently seem hesitant to mention it. It may be corrected by the operation of Howard Kelly, in which a mattress suture is placed at the site of the internal meatus so as to reef the sphincter muscle, and the displaced urethra should be restored by repair of the fascia of the urogenital trigonum.

Cystocele and Prolapse of the Uterus.

An exhaustive review of the literature of cystocele, with over 100 references, has been published by Rawls, of the Woman's Hospital in New York, which is of great value to those interested.

In early years the operative treatment of cystocele was limited to a simple denudation of the vaginal mucosa and suture, and it was not until Hadra of Texas, in 1887, first suggested freeing the bladder from the cervix and suturing the vagina high up on the uterus, thus restoring the invagination of the anterior cervix, that any great advance was made. Hadra published his idea in 1888, but it was not generally recognized or adopted until many years later.

Sims, in 1856, was the first to completely expose the base of the bladder as is done to-day. It is interesting to note that he did this accidentally while attempting to cure a cystocele by the

very radical plan of clamping off the vaginal wall and base of the bladder and cutting them away, intending to close the resulting vesico-vaginal fistula by his classical technique. To his surprise, he found that he had only removed the vaginal wall, but had completely exposed the bladder base.

It was J. Riddle Goffe, of the Woman's Hospital in New York, who in 1902 recognized that to eliminate the increased length of the bladder wall at its base, the result of overstretching, it is necessary to free it by a wide dissection from the entire vaginal wall and uterus, so that the bladder could be rotated on its transverse axis, and thus dispose of the excess by displacing it higher up.

Cystocele and prolapse uteri are best considered together, because the two conditions are usually associated in varying ratios. Cystocele alone, however, occurs not infrequently. Prolapsus uteri of any degree is accompanied by sagging of the bladder, due to its attachment to the anterior uterine wall, although there may be no injury to its fascial support. When prolapse is associated, the technique must correct that condition, or whatever operation we employ for the cystocele itself will prove unsatisfactory.

Reynolds of Boston has stressed that it is important to appreciate that the anterior vaginal wall and fascia have two fixed points of attachment—to the cervix and bases of the broad ligaments and to the posterior surface of the pubes, and that the pubic attachment of the vagina is very firm and practically never yields, while, unfortunately, the same is not true of the upper point.

The attachment of the anterior vaginal wall, and utero-pubic fascia to the front of the cervix may be torn away during labour, and with it the bladder's attachment to the same structure, thus destroying the normal depth of the invagination of the cervix in the anterior fornix. This creates a "weak spot" in the median line in front of the cervix, which favours a gradual development of a hernia of the bladder. This injury may be readily demonstrated with a sound in the bladder, the tip of the sound being almost at the external os.

The prolonged dragging on the base of the bladder and the vaginal wall caused by these injuries, results in a definite demonstrable increase in the antero-posterior measurements of these parts, so that in a cystocele of any moment we have a lengthened bladder base and anterior vaginal wall. Careful measurements taken on normal patients, and on a plaster cast made from the

cadaver of a woman with uninjured structures, show that the average normal length of the anterior vaginal wall, from its junction with the cervix to the external meatus is 6 to 7 cm., while repeated measurements which I have made on well marked cases of cystocele, show an average of 10 to 11 cm. I believe that the anterior-posterior increase in the length of the vaginal wall and the bladder base is one of the important factors to be considered in the correction of cystocele.

As the formation of a cystocele progresses, the fibres of the utero-pubic fascia become attenuated and separated in the midline, and the stretching results in a thinning of the vaginal wall in the centre and an increase in the transverse dimension of the vagina and bladder. This lateral increase is of less importance than the antero-posterior increase, although attention is usually focused upon it, and many operations rely on the correction of this to cure the cystocele.

Repair.

Two mechanical principles are involved in the correction of these injuries, namely—suspension and support. Interposition of the uterus or broad ligaments below the bladder is, of course, a form of support but is only applicable to the non-childbearing patient. Whether childbearing is or is not a factor will determine the type of operation which may be employed to correct the cystocele and prolapse of the uterus.

Childbearing Women.

In childbearing women it is necessary to employ principles in the repair which will restore the parts as nearly as possible to their normal relations, so that the function of reproduction may not be disturbed.

The essentials to correct all the injuries are:

1. Mobilization and elevation of the prolapsed bladder in the pelvis.

2. Re-attachment of the vaginal wall and the utero-pubic fascia to the anterior cervix high up, thus angulating the vaginal wall and disposing of its excess length, restoring the invagination of the cervix and anteverting the uterus.

3. Approximation of the fibres of the utero-pubic fascia at the bladder base.

4. Resection of the excess thinned vaginal wall in the median line.

5. Amputation of the cervix if elongated or diseased, and in

cases complicated with prolapsus uteri, reefing of the elongated cardinal ligaments by approximation in front of the cervix, thus throwing it back and elevating and anteverting the uterus.

If marked prolapsus uteri and an associated retroflexion are present, shortening of the utero-sacral and round ligaments is necessary.

The technique I have adopted to fulfil these essentials comprises an inverted ⊥-shaped incision wide enough to expose the cardinal ligaments, the dissection of the utero-pubic fascia from the vaginal walls, being careful not to disturb its attachment to the bladder, and the complete separation of the bladder from vagina and cervix up to the peritoneum, the cervix is then amputated or repaired, as required. A point in the bladder is selected which when carried up above the internal os of the cervix will straighten the bladder base, revolving the organ on its transverse axis, the excess being disposed of above. This point with the attached utero-pubic fascia is sutured to the anterior wall of the uterus, after Goffe's technique. The excess vaginal tissue is resected and two catgut sutures are passed through the edge of the vaginal wall including the utero-pubic fascia of the same side and through the uterine wall in the midline close under where the bladder has been attached, and out through the fascia and vaginal edge of the other side. These sutures are placed at such a point that when they are tied they will completely straighten out the slack of the wall, and by the angulation produced will dispose of its excess length and will restore the invagination of the cervix.

If the case is one accompanied by prolapsus uteri, the cardinal ligaments are isolated and, under guidance of the finger hooked under the ligaments, a catgut suture is passed in the form of a mattress stitch, taking a firm hold of the strong lower portion of the ligaments below the site of the vessels and ureters well out on each side, and including the cervix low down in the midline, after the method of Alexandroff. When the suture is tied it will approximate the cardinal ligaments in front of the cervix, reefing them, and thus elevating the uterus and throwing back the cervix. After these three sutures are placed, and before they are tied, a continuous half hitch suture of catgut is used to bring together the fascial fibres of the bladder pillars under the bladder base. The mattress stitch of Alexandroff and the two angulation sutures are then tied, and the remainder of the vaginal incision closed with interrupted sutures.

A posterior colporrhaphy and perineorrhaphy are next done,

and if marked retrodisplacement and prolapse exists, shortening of the utero-sacral and round ligaments *per abdomen* is advisable.

In the above described technique an attempt is made to correct all the injuries by combining the principles of several operations, namely: exposing the base of the bladder (Sims); freeing and elevating the bladder (Hadra); suturing the bladder to the uterine fundus (Goffe); dissection and suturing of the pubic fascial pillars (Eduard Martin); and reefing the cardinal ligaments (Alexandroff).

I call this operation a "cystopexy" as it describes its general character.

I have employed a technique based on these principles for more than 28 years, and it has given most satisfactory results and will stand the test of childbearing in a fair proportion of cases.

Procidentia.

The principle of reefing the overstretched cardinal ligaments of the upper pelvic floor, by approximating them in front of the cervix or its stump, if amputated, thus elevating and anteverting the uterus by throwing backwards the lower pole of the organ, is a *sine qua non* for the cure of its prolapse if that organ is to be conserved. This basic principle is common to various techniques which have been employed for many years.

To Donald of Manchester would seem to belong the credit for first appreciating and employing this principle in a definite manner in 1888, although he did not publish it until later. He combined an extensive anterior and posterior colporrhaphy with amputation of the cervix, using deeply buried sutures which approximated the fascial structures in front of the cervix and below the vaginal mucosa for the cure of cystocele and prolopse. Fothergill in a masterly paper on the anatomy, modifying the technique by widening the triangular denudation and encircling the cervix, demonstrated the principles of the operation, as he widely exposed the cardinal ligaments and approximated them. In his paper on "The Supports of the Pelvic Viscera," which he presented before the Royal Society of Medicine in 1907, he stresses the parametrium and paracolpium as the chief supports of the uterus and gives due credit to Alexandroff of Germany for advocating this principle for the cure of prolapse in 1903, and also to Tweedy of Ireland in 1905.

Fletcher Shaw's admirable exposition of the operation, with his follow-up report of 549 cases with a cure-rate of 96.35 per cent, and his extensive experience of 2,152 cases in 26 years, which he

ably presented before the American Gynecological Society in 1933, has stimulated and revived an interest in the Manchester technique, so that it is being widely used in America at the present time.

It is interesting to note that Emmet, Sims's successor, devised an operation for prolapse in 1869, which is based on the same principle, although he accomplished the result in a less perfect manner. Emmet denuded an area in each lateral vaginal fornix exposing the bases of the broad ligaments and an area in front of the cervix on the vaginal wall. He brought these three points together in the midline with a suture of silver wire, thus approximating the cardinal ligaments in front of the cervix. This technique, improved by Baldwin years later, has given excellent results.

Olshausen and Schröder in Berlin employed a technique on the same principle, and their results were published by Cohen in 1888.

Reynolds of Boston in 1902 described an operation similar in principle to Emmet's. Alexandroff in 1903 published his paper. He speaks of "the failure of the bases of the broad ligaments in which are incorporated the cardinal ligaments—Mackenrodt's transverse cervical ligaments." He opened the anterior vagina, separated the bladder from the cervix and broad ligaments, placed a finger under and posterior to the base of the ligaments, inserted traction sutures, crossed them and approximated the ligaments which were sutured together and to the cervix. Tweedy of Dublin in 1905 published a technique identical in principle.

E. C. Dudley of Chicago in 1906 advocated and published his operation of cutting the cardinal ligaments from the sides of the cervix and suturing them together.

Hertzler of Kansas advocated the same procedure in 1906, stating that he had been doing it for four years.

Nyulasy of Australia in 1908 described the cardinal ligaments as the chief support of the uterus and he shortened them *via* the abdominal route.

Halban of Vienna in 1919 described an operation similar in its essentials to the Manchester technique.

The failure of the cardinal ligaments due to stretching and the reefing of them in front of the cervix is the principle utilized in all these operations. The principle of the Manchester operation is therefore sound. If an efficient technique is employed, practically all cases of *descensus uteri* in the child-bearing or non-childbearing group, when it is desirable to conserve this organ, may be cured without abdominal fixation.

Thus it is seen that great minds have thought alike as to the solution of this problem.

I do not believe that this technique fulfils the requirements in all cases, however, as some have advocated. The conditions existing in women at the menopause and in old age, and the pathology which sometimes is present in younger women, may be such that other types of operation in properly selected cases will be more suitable, and at the same time give an equally satisfactory cure.

In my experience it is not unusual to find a pathological condition of the uterus or adnexa which necessitates their removal. Myoma, adenomyosis, adenoma malignum, chronic metritis, carcinoma, salpingitis and oöphoritis of various types are frequently associated with cystocele and prolapsus uteri. In a series of 116 cases of vaginal hysterectomy for prolapse at the Woman's Hospital, 83 per cent had disease or marked atrophy of the corpus uteri.

Non-childbearing Women.

In patients coming under this classification we may employ any principles in the repair calculated to produce the most positive fixation of the organs irrespective of their normal relations. There are two schools of thought as to the best means of curing patients in this group; one using combined vagino-abdominal methods with fixation to the abdominal wall, and the other believing in vaginal reconstructive technique alone.

Personally, I believe that if our theory of the support of the pelvic viscera is correct we should be able to cure the hernia by vaginal plastic operations, and that only in very rare instances should abdominal fixation be necessary as it adds to the mortality and morbidity of the operation, especially in old women who are usually in this class. It is essential that, if fixation above is employed, vaginal plastic operations must also be used, otherwise failure will occur as a result of elongation of the anchored tissues, just as elongation happens when the savage attaches a stone in the lobe of his ear.

In those patients who possess a normal uterus though not functioning, an operation of the Manchester type is perfectly suitable. Likewise such cases with extensive cystocele, if they have but a moderate degree of prolapse, may be satisfactorily cured by the transposition operation of Watkins.

WATKINS'S TRANSPOSITION OPERATION.

In the German literature this technique is known as the interposition operation of Schauta and Wertheim, no credit being given to its originator, Watkins of Chicago, a graduate of the Woman's Hospital, who first did the operation in January 1898, more than a year before Schauta or Wertheim. An interesting account of this is given by Farrar of the Woman's Hospital, who was present in Vienna in the clinic at the time of the controversy between Schauta and Wertheim.

The Watkins operation has definite limitations, and the success of this technique will depend upon the proper selection of cases, and careful attention to details. It is only suitable for those women who cannot or should not bear children. If the patient is still menstruating, or the menopause is not definitely established, the Fallopian tubes must be sterilized. The uterus should be normal or only moderately enlarged. It should be of firm consistence, and free of any suspicion of disease. The small flabby atrophic uterus seen in senile patients, or a uterus of the infantile type, will not give a satisfactory result. The question as to whether the cervix is to be amputated or not may affect the suitability for this operation, as the uterus should be of sufficient length, 8 cm. is desirable.

Jelleti of New Zealand has given an excellent description of how this operation fails in unsuitable cases. He states the cystocele may always be cured if the operation is properly performed under suitable conditions, but not if there is extreme prolapsus uteri. In cases of moderate prolapse, he advocates shortening the utero-sacral ligaments as part of the technique. I prefer not to employ this operation in patients with more than a moderate prolapse. It is particularly applicable in obese old women with extensive cystocele and a moderate degree of descensus, where the senile atrophic changes in the vagina and fascia are such that they are attenuated, and are of little value for support.

The Watkins operation corrects the hernia by a substitution of the anatomical relation, thus indirectly nullifying it. The transposition of the relations of the bladder and the uterus corrects the cystocele by supporting it on the posterior surface of the uterus, and the prolapse by shortening the broad ligaments as a result of the twist produced by the 180 degrees or more change in position.

The advantage of this operation is that it is easily and quickly performed, allows of inspection and any necessary surgery of

the adnexa, and if properly done will stand the strain of hard work better than colporrhaphy, or abdominal fixation operations.

An objection has been advanced that it is frequently accompanied with bladder complications. That has not been my experience.

Important points in the technique which ensure success are as follows:

Preliminary curettage should always be done to exclude possible malignancy.

If the cervix is to be removed the amputation should not be too high, as the uterus must not be shortened too much, as a proper length and firmness of the cervical tissues are of advantage in maintaining its reversed position.

An inverted ⊥-shaped incision is made, and a complete separation of the bladder from the uterus, vagina and broad ligaments is necessary.

The peritoneum is opened widely and, after delivering the fundus uteri, inspection and necessary surgery of the adnexa are done.

The peritoneal reflection of the bladder should be sutured well down on the posterior surface of the uterus so as to allow ample space for the bladder, and to close the abdominal cavity.

The usual method is to suture the fundus uteri in the midline to the margins of the vaginal wall after the excess has been cut away. I have modified this technique to secure a firmer anchorage by suturing the uterine cornua to the periosteum of the pubic rami, as well as to the vagina. This is accomplished by passing a short stout curved needle, armed with chromic gut, into the periosteum of the ramus under the pubic arch about 2 cm. from the midline, and then through the uterine cornu and tied. A similar suture fixes the other side.

It is important to place a third suture in the midline, catching the tissues on both sides of the urethra and the centre of the fundus uteri, thus preventing prolapse of the urethra or bladder over the uterus. A careful adjustment of the fundus uteri to the urethra with this suture will correct a urethrocele if present and overcome stress incontinence. The vaginal incision is closed with interrupted catgut sutures, which include the uterine wall. An ample posterior colporrhaphy and perineorrhaphy complete the operation.

Experience has demonstrated the wisdom of an outlet for any oozing of blood, should it persist after extensive dissection in this location. If necessary temporary drainage is provided by inserting

a rubber tissue drain in the line of the incision and extending it up on each side between the uterus and the vaginal wall. A linen thread is tied to a strip of rubber tissue in its centre with a small roll of iodoform gauze at the other end. The roll of gauze is tucked into the vaginal entrance at the completion of the operation where it can be readily removed with a thumb-forceps. Thus troublesome haematomata or infections may be prevented.

Mayo's Operation.

In my experience a fair proportion of patients in the non-childbearing group have some disease of the uterus which makes it desirable to eliminate this now useless organ. Myomata are common, and even though myomectomy is feasible, as they are usually multiple, there is a definite possibility of a later development of a minute myoma that has been overlooked. Adenomyosis and fibrosis are also frequent, and the incidence of subsequent malignancy in older women is not to be disregarded. Chronic infection and associated adnexal disease are frequently found. If we find a small flabby senile corpus uteri and an hypertrophied diseased cervix, what remains after amputating the cervix is of little use for support.

In such cases there is a definite advantage in removing the uterus, and in patients with complete or extensive procidentia, the Mayo type of operation as I have modified it has given me satisfactory results. The principle of the Mayo technique for the cure of cystocele and prolapse is precisely the same as in the interposition operation. The uterus being removed, the broad ligaments are sutured together and interposed under the bladder in the same manner as is the uterus, and they are anchored to the vagina in the same way.

As this type of operation is especially indicated in patients with marked prolapse, there is naturally an extensive stretching of the utero-sacral ligaments, and frequently a hernia of the posterior vaginal fornix, or enterocele, is present. This is the weak point of the operation, for while it always corrects the cystocele, an imperfect result may occur due to a failure to recognize and correct an enterocele, and to shorten the utero-sacral ligaments. I have consequently modified the technique, and always remove the pouch of Douglas, and shorten the utero-sacral ligaments so as to correct this defect, and I also anchor the top of the united broad ligaments to the periosteum of the pubic rami as well as to the vagina.

The essential points in the technique as devised by Charles

Mayo, and as I have modified it are, to make a similar type of incision as in the Manchester operation with complete separation of the bladder from uterus and vagina. The peritoneum is then opened anteriorly and posteriorly. Having pushed up the bladder into the abdomen, clamps are placed on the utero-sacral ligaments close to their cervical attachment to facilitate their indentity. The uterus is then delivered. A Kocher clamp is placed on the left broad ligament from above downward close to the uterus, which is cut away down to the tip of the clamp. A second clamp, placed in front of the first, grasps the broad ligament lower down in the same manner, and the uterus is still further cut away. A third clamp is placed likewise, the tip including the base of the broad ligament, the cardinal ligament and the utero-sacral ligament. The uterus is then entirely freed from the left broad ligament, and the same procedure is carried out on the opposite side and the uterus removed. Both broad ligaments, including the Fallopian tubes if retained, round ligaments, cardinal ligaments, and utero-sacral ligaments, are now in the grasp of the clamps with the pouch of Douglas lying between and within easy reach. The peritoneum of this *cul-de-sac* is then dissected out up to the utero-sacral ligaments and cut away. The utero-sacral ligaments are brought into view by traction on the forceps, previously placed to identify them, and they are then sutured together with interrupted linen sutures as far as the rectum. A purse string suture of linen is then passed through the base of the cardinal ligament on one side, and catching the united utero-sacral ligaments as high up as possible comes out through the base of the opposite cardinal ligament. This suture is not tied at this time. The clamps holding the broad ligaments are then brought together in a parallel position and the ligaments are firmly united with a continuous mattress suture of chromic catgut beginning at the base, and placed behind the clamp, they being removed as the suturing progresses. After the top of the ligaments are firmly tied, the same suture is continued downwards as a lock stitch uniting the cut edges of the ligaments.

The peritoneal reflection from the bladder is then sutured to the back of the united ligaments, thus closing the abdominal cavity, the bladder being entirely replaced in the abdomen. The anchorage of the united ligaments to the periosteum of the pubic rami is next effected in the same manner as in the modified Watkins's operation, and the third suture placed to support and hold the urethra. The suture passed through the utero-sacral and cardinal ligaments is then tied, thus reefing them, and carrying the base of the united ligaments as high up as possible.

The vaginal incision is then closed with interrupted catgut sutures, which include the united ligaments. If necessary a rubber tissue drain, as previously described, is passed in the suture line between the ligaments and vaginal wall to take care of oozing. A posterior colporrhaphy and perineorrhaphy to correct the rectocele and relaxed or lacerated pelvic floor completes the operation.

ENTEROCELE.

A hernia of the posterior vaginal fornix may occur without being associated with uterine prolapse. The peritoneal sac of Douglas with intestinal contents dissects its way downward in the line of cleavage between the rectum and the posterior vaginal wall. It is comparatively rare and is frequently confused with rectocele. It is an entirely different lesion, although the two conditions may be frequently associated. Until recent years there were few recorded cases, although Sir Astley Cooper published a case in his classic work on hernia in 1804.

The rarity of this condition is undoubtedly due to the obliquity of the pelvic cavity in the erect posture, the intra-abdominal pressure thus being deflected forward, and to the very strong pelvic and recto-vesical fasciae, the fibres of which are intimately interwoven with the walls of the canals passing through the pelvic floor. Moschcowitz calls attention to the fact that this fascia has a funnel-shape attachment to the rectum, and that a defect here will allow the intestine to push through along the rectal wall to the levatores ani, forcing the peritoneal lining of the *cul-de-sac* ahead of it. Such a congenital defect in the fascial attachments would, therefore, account for such condition in a virgin. Pregnancy and labour causing stretching or separation of the fibres of the fascia would account for the acquired form.

The differential diagnosis between rectocele and enterocele is easily made with a finger in the rectum.

Zuckerkandl, Freund and others have shown that the *cul-de-sac* of Douglas normally extends to the levatores ani in the foetus, and that its depth gradually decreases from this time until puberty, when it reaches the level of the second or third sacral vertebra. Daniel Jones of Boston has pointed out that a deep *cul-de-sac* is an important factor in favouring or producing prolapse of the uterus, and he states that the downward pressure made in the *cul-de-sac* against the posterior vaginal wall will demonstrate a strong pull on the uterus. Jones believes that

this accounts for uterine prolapse in virgins, as these patients always have a deep posterior *cul-de-sac* of congenital type.

The technique of the operation for enterocele which I have devised, when the uterus is to be retained, is as follows:

A gauze sponge on a holder is inserted into the rectum as a guide. The posterior vaginal wall is opened in the midline for its entire length, and the peritoneal sac dissected free up to the utero-sacral ligaments. The sac is opened, the intestines pushed back, the base of the sac is clamped, cut off, and ligated, and the utero-sacral ligaments, which have been put on the stretch by pulling the cervix sharply upwards, are united with interrupted Pagenstecher linen sutures as closely to the rectum as possible. The denuded space is obliterated with continuous buried catgut sutures, and the vagina is closed.

I have already described the technique in cases of enterocele associated with uterine prolapse when the uterus is to be removed by the Mayo technique.

Rectocele and Injury to the Pelvic Floor

Injuries to the pelvic fascia and levatores ani, causing relaxation of the pelvic floor and rectocele, and increase in the calibre of the vagina as a result of childbirth, are common in nearly all cases of genital prolapse. Consequently an operation for their correction is a necessary part of all techniques. A proper understanding of the mechanism of the closure of the vaginal orifice is necessary to appreciate the impaired function.

The usual idea is that the closure of the vaginal introitus is sphincteric, similar to the anus, while the actual mechanism of opening and closing the orifice is quite different. This may be illustrated by comparing the mouth with the vaginal orifice as an analogy. In the mouth we have a transverse opening, with a fixed upper jaw and a movable lower jaw, which is closed by raising the lower against the upper by the masseter muscles. If these muscles are torn or stretched, an inability to close the mouth results, and the lower jaw drops. In the vaginal orifice we find a transverse slit with a fixed anterior, and movable posterior segment constituting the pelvic floor. The orifice is closed by lifting the mobile posterior segment up against the immobile anterior segment by the levatores ani muscles, as in the mouth. The levatores ani muscles, which encircle the rectum, are supported and strengthened in the vaginal sulci by the pelvic fascia on their superior and inferior surfaces. This fascia and the muscle fibres in the sulcus may be ruptured by the advancing

foetal head, when they receive the brunt of the strain during internal rotation, or they may be torn in both sulci by the blades of the forceps. The ruptured pelvic fascia allows the strain to fall upon the anterior fibres of the levatores ani, which may be torn away from their lateral attachments to the rectum and perineal body. The consequence is ultimate stretching and relaxation so that the posterior segment of the pelvic floor cannot be properly elevated.

The vaginal mouth, therefore, is constantly gaping, and the unsupported vaginal walls with their attached viscera tend to roll down and out especially in the erect posture. The support of the posterior vaginal wall and rectum is dependent upon its fasciae propriae and the firm barrier formed by the fusion of the two layers of the levator fascia, the fascia of the urogenital trigone and Colles's fascia in the perineum. If this fascial support of the posterior vaginal wall and rectum is injured, the open vaginal introitus favours a hernia of the anterior rectal wall, or rectocele. Such an anatomical cleavage alters the normal mechanism of defaecation by diverting the direction of the faecal current so that the anterior rectal and posterior vaginal wall receive its impact. This tends to form a rectal pouch and makes complete evacuation difficult.

The usual methods in vogue for curing this hernia consist of resection of the excess vaginal wall and suturing of it and the underlying fascia. The result, so far as the bowel is concerned, is to throw it into folds, which tend to be smoothed out by the daily passage of faecal masses, especially if constipation exists. In these operations a perineorrhaphy is relied on to close the vaginal orifice and thus prevent further descensus. In the majority of cases with a small or moderately sized rectocele, these methods are satisfactory. In large rectoceles, however, the usual operative procedures may not give as perfect a result as is desired.

The causes of rectocele and cystocele are similar, both being due to an injury of their fascial supports, and their development is accelerated by the patulous vaginal orifice which results from a sulcus injury. As a rectocele parallels cystocele it is logical to apply the same principle in its cure which has proved successful in vesical prolapse, and this I have done with uniform success since 1911.

The rectum is completely separated from the posterior vaginal wall up to the region of the cervix. The loosened rectal pouch is then carried upwards along the vaginal wall well beyond the site of the vaginal part of the rectocele, and fastened by its fascial

attachments in its new position with a suture. The fascial opening is then closed. Thus the denuded rectum is drawn up so as to adhere to the upper undamaged vaginal wall above the site of the former rectocele, and the vaginal portion of the rectocele is excised. I have designated this procedure as a "rectopexy." The operation is completed with a perineorrhaphy in which the anterior fibres of the levatores ani and fascia are approximated in the midline. The barrier of muscle and fascia thus formed acts as a dam to prevent recurrence of the rectocele and the reefing of the levators gives an effective restoration of the closing function of the vaginal orifice. The Hegar denudation employed reduces the enlarged calibre of the vagina.

Since Curtis of Chicago demonstrated that residual urine, the result of post-operative vesical atony, was the cause of post-operative vesical irritability and cystitis, it has been my custom to employ a self-retaining catheter in all operations in which the bladder is involved. This is retained for five or six days and has the advantage of keeping the bladder empty, and only necessitates one catheterization. I have rarely had complications or discomfort from this procedure.

Patients of advanced age whose physical condition precludes the employment of extended operations, and those who have complete inversion of the vagina following hysterectomy, may be cured by the LeFort operation of subtotal colpectomy, which is easily performed with hardly any shock, and gives excellent results.

I do not approve of in principle the operation of abdominal fixation for the cure of prolapse. Frank of New York states that there is a tendency to develop ventral incisional hernia, and he has had that experience in 21 out of 200 cases, or 10.5 per cent. The occurrence of hernia after ventral fixation appeared to be directly proportional to the amount of drag exerted by the uterus and greatly exceeds the herniae found in his other laparotomy incisions, which was 0.8 per cent.

It has been proved by many operators that even the worst type of uterine prolapse may be cured by vaginal plastic surgery.

Results.

In evaluating the results of the various operations for genital prolapse we are handicapped by the many different types and degrees which have varying probabilities of cure. Also we are at a disadvantage owing to the lack of a uniform classification

based on the age, general body health, strength of fascia and muscle, and obesity, as well as the social status and occupation, all of which play a *rôle* in influencing results.

The older patients, on account of their restricted muscular activities, may escape a recurrence, while a young, hard working or athletic woman has a failure with the same operative procedure.

There seems to be no agreement as to the time which should elapse before a patient is considered cured.

A follow-up by correspondence is of doubtful value in many instances. The personal follow-up is the only positive means of ensuring accuracy. Consequently it is difficult to compare results as there are at present many chances of error in the published reports.

In my own cases which cover a period of more than 30 years, some of the earlier ones have an incomplete follow-up, since a definite system was not then in vogue in our hospitals. Since 1918 an organized follow-up system with a social service control covering all ward cases has been functioning in the Woman's Hospital, so that our records since that date are much more valuable.

Dr. Bullard of the Woman's Hospital has made a study from our records of the end results of uterine prolapse of a ten-year series. His report covers some 461 cases done by 30 operators. Ninety per cent of the patients had a personal follow-up for several years. All had vaginal reconstructive surgery except seven which were corrected by the abdominal route. In this series there were 77 Watkins's interposition operations with satisfactory results in 96 per cent, 50 Mayo's operations of which 94 per cent were classed as satisfactory, and 81 vaginal plastic operations (repair of cystocele and pelvic floor) with 97.5 per cent satisfactory. The seven abdominal cases had two failures, or 71.4 per cent of success. In this series 72 per cent of the failures occurred within six months, and only 8 per cent. occurred later than two years after operation. Bullard states that the striking thing about his study is that 95 per cent were cured by vaginal plastic surgery, and that careful fascial reconstruction is responsible for the success.

A review of the cases of genital prolapse, including prolapsus uteri, cystocele, urethrocele, enterocele and relaxed pelvic floor, operated by the staff of the Women's Hospital from 1915 to 1934, and my own results from 1918 to 1934 inclusive, are as follows:—

TABLE I.

1915-1934 *Inclusive.*

Total ward cases operated on all four divisions and my personal cases	1938
Vaginal hysterectomy	407
Watkins's interposition	256
Vaginal plastic	1115
Vaginal and abdominal section	160

Mortality, 28, or 1.44 per cent.

TABLE II.

1918-1934 *Inclusive.*

Total cases operated on my division and my personal cases	469
Vaginal hysterectomy (Mayo)	114
Watkins's interposition	89
Vaginal plastic (cystopexy, etc.)	221
Vaginal plastic and abdominal section	45

Mortality, 5, or 1.06 per cent.

TABLE III.

Follow-up Results. 1918-1934 *Inclusive.*

Total ward and personal cases on my division in follow-up	464
Total cases personally followed one and more years (88.36 per cent)	410

Satisfactory results, 383, or 93.41 per cent.

End-results by Types of Operations.

Mayo's Operation	108

Satisfactory, 92, or 85.18 per cent.

Watkins's interposition operation	72

Satisfactory, 69, or 95.9 per cent.

Cystopexy, including rectopexy and perineorrhaphy	191

Satisfactory, 183, or 95.80 per cent.

Cystopexy and abdominal section	39

Satisfactory, 100 per cent.

TABLE IV.

Enterocele (1918-1934)

Total cases—all divisions (with and without associated genital prolapse)	84
Total ward and personal cases in my division	60
Operation for enterocele with other prolapsus	38
Operation for enterocele without other prolapsus	22

Total cases followed one and more years, 55, or 91.6 per cent.
Satisfactory, 53, or 96.36 per cent.

Cases Operated by Myself.

Total Mayo's operations, 1918-1934	82

Enterocele developed post-operation, 15, or 18.2 per cent.
Percentage of enterocele following Mayo operations—1918-1923—25.5 per cent.

Total Mayo's operations, 1923-1934 40
Enterocele developed post-operation, 4, or 10.0 per cent.
(After improved technique of obliteration of cul-de-sac and suturing utero-sacral ligaments.)

Conclusions.

The supports of the pelvic viscera, as demonstrated by the anatomists and clarified by Fothergill, Bonney, Frank and many other gynaecologists, are scarcely open to discussion, and upon this knowledge are based the principles we should employ to-day in the cure of genital prolapse.

The vaginal operations are the methods of choice in nearly all cases because of the minimal amount of post-operative shock and the easy convalescence, especially in old women.

In the childbearing age our plan of operation should be to employ a technique which while curing the injury will at the same time restore the parts as nearly as possible to their normal relations in order that the function of reproduction may not be interfered with.

In the non-childbearing group, if the uterus and adnexa are normal, the Manchester type of operation is ideal.

If the cystocele is very large with poor fascial and vaginal tissues and only a moderate degree of prolapse of the uterus, the interposition operation of Watkins gives excellent results.

If the uterus or adnexa are diseased, or with excessive prolapse, the Mayo type of vaginal hysterectomy is curative if the utero-sacral ligaments are shortened and the possibility of an enterocele eliminated.

Enterocele and rectocele should be differentiated and repaired on the same principle as hernia in other locations.

In all operations the axis of intra-abdomial pressure must be correctly directed by placing the uterus in an anteverted position.

Our follow-up shows that genital prolapse may be cured by various techniques in approximately 95 per cent of cases, provided the operations are based on the accepted principles for the cure of hernia and a correct understanding of the supports of the pelvic viscera.

As there are several types of genital prolapse, and as it is a many sided complex problem, no one operation is applicable to every case, and in evaluating various methods it is well to remember that "many roads lead to Rome."

In determining the most suitable procedure and judging results we must consider the general physical condition of the patient as well as her age, social and economic status.

Finally, the most successful surgeon in the cure of genital prolapse will be he who, with a wide knowledge of all the methods at his command, chooses the one which will be best suited to the individual case.

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[*The discussion on this subject at the Congress of Obstetricians and Gynaecologists at Belfast is on page* 767.]

The Prevention of Puerperal Sepsis

BY

LEONARD COLEBROOK, M.B., B.S. (Lond.).

Member of the Scientific Staff, Medical Research Council; Hon. Director, Research Laboratories, Queen Charlotte's Hospital.

TEN years experience of puerperal infections, both from the clinical and laboratory standpoint, has led me to think of them as divisible into two broad categories.

First, those which are intimately associated in their origin with injury to the maternal tissues during the process of childbirth. While some of these injuries are perhaps unavoidable, I believe you will agree that many of them are the result of bad craftsmanship and that they are much more numerous than they need be.

The bacterial infections which complicate recovery from these injuries vary very much in character. The haemolytic streptococcus is by no means always associated with such injuries—probably it is not present in half of them—but when it is, the clinical picture becomes very much more alarming. Very many of these injuries are infected only by the less pathogenic microbes which are commonly present about the vaginal orifice, the anaerobic and other non-haemolytic varieties of streptococcus, bacillus coli, and staphylococcus. These microbes find conditions peculiarly favourable to them in injured and devitalized tissues, the blood-supply of which is interfered with. Since infections of this kind are so closely associated with trauma their prevention may be summed up in two words—better midwifery. It would be impertinence for me to offer my views as to how this is to be attained.

My second category of puerperal infections comprises those cases in which childbirth has been accompanied by little or no trauma, and the ensuing puerperal fever is attributable to one incident, namely, the arrival of the haemolytic streptococcus in the genital tract of the mother. I have spoken deliberately of the microbe's 'arrival'—implying thereby that it comes *from outside the genital tract*, because I think the data we now have

make that about as certain as anything in medicine. This contention, if it is true, seems to me of the utmost importance, because it leads inevitably to the conclusion that most of these infections by the haemolytic streptococcus—which account for so many maternal illnesses and deaths—could be prevented if we were setting about their prevention in the right way.

The evidence on this matter does not amount to absolute proof. In the nature of the case we cannot expect, and shall never have, absolute proof, but I submit that the evidence is now complete enough to satisfy all except those who demand a cinema film showing every step of the journey of the infecting microbe.

Speaking to the British Medical Association in Dublin nearly three years ago[1] I referred to the fact that some two to three per cent of women had haemolytic streptococci in the genital tract at the onset of labour, but that less than one in 10 of these women had any fever during the puerperium. (Taylor and Wright.[2]) We did not then know the explanation of this. Now we do. Thanks to progress in the differentiation of the streptococci by workers in America and elsewhere,[3, 4, 5, 6, 7] and to the application of this new knowledge by my colleague Dr. Ronald Hare, it is quite clear that these streptococci from two to three per cent of women during labour are not the same as those which cause puerperal fever.

We can no longer speak of the haemolytic streptococcus as if it was a sharply defined variety or species. The ability to haemolyse red blood-cells is a property shared, to greater or less degree, by several distinct groups of streptococci. Only one of these groups (spoken of as Group A) is commonly responsible for severe human infections (including puerperal fever); others are responsible for certain infections of animals, e.g. mastitis of cows, and strangles of horses; others again, so far as we know at present, are non-pathogenic. My colleague Dr. Hare, with Mrs. Lancefield of the Rockefeller Institute,[8] has shown that the strains recovered from two to three per cent of women at the onset of labour belong to these latter varieties which very rarely cause severe infections in man. Swabs taken from mild puerperal infections not infrequently yield a few colonies of such streptococci but it is difficult to be sure in these circumstances that they are invading the tissues. Once or twice they have been found in association with other organisms, e.g. staphylococci or anaerobic streptococci, in a fatal septicaemic infection.

All the evidence we have, therefore,—based on the examination of swabs from 855 women by my colleagues Drs. Fry and Hare—

indicates that the dangerous variety of haemolytic streptococcus is hardly ever present in the genital tract at the onset of labour.[8]

This would seem at first sight to dispose of the idea of a true endogenous puerperal infection by haemolytic streptococci, but I know that that conception is dear to the heart of some obstetricians and they will not readily part with it. Some of them tell me with assurance that the non-haemolytic streptococci so frequently present in the normal vagina can doubtless undergo transformation into the haemolytic variety. Such a transformation in the case of non-haemolytic streptococci from the throat has even been reported as occurring in the laboratory,[9] but the evidence given was very scanty and the author did not even suggest that the transformed cocci had acquired any of the properties of S. pyogenes other than its haemolytic property. In spite of the fact that the common experience of bacteriologists all over the world is against such a transformation I have undertaken an *ad hoc* investigation, using the methods described by Bonciu. The investigation has entirely failed to support her observation.

Still more recently it has been suggested that the non-pathogenic varieties of haemolytic streptococci occasionally found in the vagina before labour[8] may undergo transformation into the pathogenic, Group A, variety. In the absence of any single observed fact supporting it, this speculation must be regarded as highly improbable, although the bare possibility of such a transformation may well be kept in mind.

If, then, you will concede to me that the haemolytic streptococcus found in the genital tract during puerperal fever was not present at the onset of labour, we are bound to assume that it reached that tract from some outside source. That must mean one of two things, either it came from some other part of the mother's body by an internal route such as the blood-stream, or it was conveyed by an external route.

What is the evidence with regard to these alternatives? One fact has come to light recently which compels us to consider the possibility of the first alternative—i.e. transfer of the streptococcus from some other part of the mother's body by the blood-stream. Okell and Elliot[10] recently reported a series of blood-cultures frou 138 people with pyorrhoea before and after the extraction of teeth. They did not recover haemolytic streptococci from the blood in any instance, which is not surprising, because that organism is seldom present in the mouth with pyorrhoea, but they did find non-haemolytic

streptococci in the blood of 70 per cent of the patients after extraction; and—what is more important—of nearly 11 per cent before extraction. That must mean, I suppose, that in pyorrhoea there is fairly often leakage of a few organisms from the diseased gums into the blood-stream; and it naturally suggests the question whether possibly a similar leakage may occasionally occur in the throat carrier of haemolytic streptococci. As I shall tell you later, something like seven per cent of the population have potentially pathogenic haemolytic streptococci in the pharynx; and the number is higher at certain times and in certain circumstances. By far the greater number of those throat carriers do not present any evidence of actual infection of the tissues; the mucous membrane of the pharynx appears to be intact; and, judging from the growth obtained from swabs, the number of haemolytic streptococci present is not very large. Even when there is a severe infection of the pharyngeal tissues, with ulceration, as in scarlet fever, it is a rare event for streptococci to be found in the blood-stream[11]—presumably because their entry is blocked by the lymphatic glands.

The circumstances in pyorrhoea would seem to be much more favourable to leakage of bacteria into the blood-stream, for here, in addition to the very heavy infection and often widespread ulceration, the tissues are constantly subjected to minor injuries by the mastication of food, and cleansing of the teeth. That these injuries frequently result in rupture of blood-vessels (allowing direct access of streptococci to the blood-stream) is clearly shown by the bleeding from the gums so often experienced in pyorrhoea.

I think we are justified in concluding, provisionally, that the transfer of haemolytic streptococci from the throat via the blood-stream at the time of labour is so extremely improbable as not to be worth serious consideration. A series of blood-cultures on throat carriers is, however, being made at Queen Charlotte's Hospital in order to verify that conclusion. So far there has not been any positive result.

In passing, one other observation may be noticed which is sufficient in itself, I think, to establish this conclusion. If transfer of the haemolytic streptococcus by way of the blood-stream, from the mother's throat or elsewhere, was a common source of puerperal infections it would be quite beyond our control, and not any large maternity institution could show an almost complete absence of such infections. Very careful enquiry into the records of at least three hospitals in London, where bacteriological ex-

amination of every febrile case has been conscientiously carried out over periods of 18 months and upwards, has satisfied me that this almost complete elimination of haemolytic streptococcal infection is actually being achieved. The haemolytic streptococcal infection rate in these three institutions has certainly been below two per 1,000 deliveries as compared with the 10 to 20 per 1,000 which I estimate to be the average for England and Wales.

Having, then, reached the conclusion that the haemolytic streptococci of puerperal fever are not present in the genital tract before labour, and have not been carried to it by an internal route, we are driven to postulate transfer of the microbe by an external route and from some external source. A great body of evidence in favour of this view has accumulated in recent years and I will now summarize it very briefly.

The evidence falls naturally into two parts. In the first place we know a great deal now as to the *potential* source of these streptococci—where they are, or are not to be found, in and about human beings. In the second place we have circumstantial evidence—most carefully collected and sifted, pointing to the conclusion that in a considerable number of women puerperal infection was almost certainly due to transfer of the streptococcus from one or other of these potential sources. In other words we are able to generalize with a high degree of probability as to what are the most common sources of danger—and that is, surely, the beginning of sound preventive measures.

The Potential Sources of Infection by Haemolytic Streptococci.

These organisms are not found on the perineal and circum-anal skin of normal women (Colebrook, Maxted and Morris Johns[12]). They are not found in the lower bowel of normal women (Hare and Maxted[13]), although, during the acute stage of scarlet fever—and presumably also of tonsillitis—one case in five has a certain number of them in the stools. If labour should happen to coincide with one of these conditions there will be a chance of direct transfer from the anal region to the genital tract.

Next, we know that haemolytic streptococci, of precisely the same kind as those which cause puerperal fever, are present in a great variety of commonly occurring septic conditions; and it should be noted that these are almost all open lesions, giving abundant opportunity for the dissemination of the microbe. Moreover many of them are conditions which are habitually treated at home. The conditions I have in mind include tonsillitis

and scarlet fever, otitis media and mastoid disease (so frequently followed by prolonged suppuration) erysipelas, nasal sinus infection, wound infection of all kinds, burns, whitlow, quite trivial finger infections, and impetigo. And, lastly, symptoms more or less closely resembling those of the common cold or so-called influenza may sometimes be associated with streptococcal infection. All these conditions must be regarded as depots from which haemolytic streptococci may, in suitable circumstances, be conveyed to the woman in labour.

In addition I have already mentioned that about 7 per cent of the population are throat or nose carriers of this same microbe without having any apparent signs of definite infection.[14] Nearly 4 per cent of normal women were also found to be carriers of haemolytic streptococci (Group A) on the skin of the hands. (181 subjects examined. Colebrook, Maxted and Morris Johns.[12]). It seems probable that in some of them the streptococci may have been derived from the respiratory tract.

Quite recently we have learned of yet another potential source which must be taken into account—viz, the air. The recognition of this danger is due to Cruickshank.[15] He was studying the bacteriology of burns in a Glasgow hospital, and found that every one of them became infected by haemolytic streptococci. On investigation it transpired that the air of the ward in which the cases were nursed was often heavily contaminated by those microbes, whereas the air of medical wards in the same hospital was not. My colleague, Dr. Elizabeth White, has confirmed and extended that observation in our septic wards at Queen Charlotte's Hospital. To my great surprise a culture plate exposed in a ward where a bad case of puerperal fever was being nursed would occasionally grow from 100 to 200 colonies of haemolytic streptococci after the air had been disturbed by making the bed or sweeping the floor. Dr. White's observations, recently reported,[16] make it clear that this potential source of infection cannot in future be left out of account. I am reminded in this connexion of a patient from our own District. The nurses who delivered her did not have any haemolytic streptococci in their throats, but a profuse growth of the microbes was obtained from the discharging ear of a child of the patient; another child also yielded an abundant culture from the throat; and a third child a less abundant culture. Looking back on this situation it is not difficult to imagine how the streptococci may have reached the mother. Up till the beginning of labour the children and the mother were almost certainly using the same hand basin and towel. Pus containing countless living strepto-

cocci from the child's ear may easily have become dried on the edge of the basin, in which the maternity nurse and the handy-woman subsequently washed their hands; or the mother's hands, contaminated by the family towel, may have conveyed the cocci direct to the vulva; or the dust of the room may have been impregnated with desiccated pus flaked off the skin of the child with the infected ear and mucous particles from the throat and nose of the other children. Any one of these possible happenings may have been responsible for the mother's infection. It is not surprising that masks, gloves and strict asepsis on the part of the attendant nurse, failed to prevent this mishap. The conduct of a confinement in such a streptococcus-infested environment, however carefully conducted, must expose the mother to an extremely heavy risk.

Although the danger of air-borne infection must be kept in mind, let us not overestimate its importance. From the data we have, I think it extremely unlikely that the ordinary throat carrier without pharyngeal infection creates a zone of streptococcus-carrying dust particles around him or her; but there is no doubt that such a zone is created around a patient freely discharging pus laden with these cocci, especially if that discharge is in a situation which permits of the soiling of a large area of the skin.

It is clear then, that we must recognize many potential sources of infection by this ubiquitous organism, but it behoves us to be cautious in deciding too dogmatically that any one of them is the chief danger. There is now, however, a good deal of circumstantial evidence—most carefully collected—to guide us. I will deal with that next.

Owing to the circumstance that the haemolytic streptococci dangerous to man (Group A) are not all strictly identical, but are divisible into some 20 or 30 distinct types, the members of which are recognizable by serological tests (Griffith[17]), we can frequently, although not always, determine whether the streptococcus infecting Mrs. Brown is or is not of the same family or type as that recovered from a swab from her own throat, or her nurse's nose, or her child's impetigo. When such identity has been established it does not constitute absolute proof that the streptococcus was conveyed to the mother's genital tract from the throat or nose or skin, but it does indicate an enormously strong probability of such a transfer—and in medicine we habitually have to act on strong probability rather than complete certainty.

There is now a considerable accumulation of evidence based on

such probability. I need hardly remind you of Smith's work in Aberdeen[18, 19]; of Paine's work in Sheffield[20]; of Nixon's and Wright's in London[21]; all pointing to the predominant importance of organisms carried in the respiratory tract of attendants for the woman in childbirth. Dr. Dora Colebrook's recent Report[22] is, I think, of still greater value, not only because she was able to deal with a larger series of cases, but also because, by some technical improvements which I need not specify here, her proofs of identity or dissimilarity of strains are more convincing to bacteriologists familiar with the special difficulties of this kind of work. Her findings, moreover, were to a large extent double-checked by the application of two methods; and she has been very cautious in drawing conclusions, especially when the laboratory results were not 100 per cent satisfactory. A large part of her Report is, of necessity, intelligible only to bacteriologists, but she has summarized her epidemiological evidence and conclusions and the following are the most important points emerging from the Report:—

1. A *complete* investigation, to find the source of infection, was made in connexion with 31 cases of puerperal fever. (By "complete" is meant that throat and nose swabs were obtained from all the attendant contacts as well as from the respiratory tracts of the patients themselves). In no less than 87 per cent of the cases an extra-genital strain identical with that infecting the mother was found, and there are good reasons for believing that a somewhat higher figure would really represent the truth. In other words a "probable" extra-genital source of the uterine infection, my sister prefers to speak of it as a "possible" source, was discovered in nearly 90 per cent of her completely investigated cases.* Frequently this probable source was in the respiratory tract of the patient herself; rather more frequently in the respiratory tract of somebody in contact with her; in not a few instances the identical strain was found in the respiratory tract of the patient and a contact so that one could not do more than guess at the actual mode of infection; and in a very small proportion of the cases the probable source was traced to a septic focus either on a "contact" or the mother herself.

2. In connexion with 32 other cases the investigation was *less*

*Cases chosen for investigation were not quite a random sample of puerperal infection. A minority of them was selected because infection had occurred in circumstances (e.g. scarlet fever in a member of the family) which suggested the probability of an extra-genital source.

complete because not quite all the necessary contact swabs could be obtained. An extra-genital strain identical with that infecting the mother was found in 65.6 per cent of these cases.

3. In 20 per cent of the cases investigated a 'contact' was known to have suffered from an inflammatory condition of the nose or throat shortly before the confinement; and from all but one of these contacts the swab yielded a streptococcus identical with that which infected the mother (p.68).

4. In 20 per cent of the cases investigated, a streptococcal strain identical with the infecting strain was found in a member of the mother's family. The number might well have been higher had we been able to obtain swabs from the complete household of every patient.

5. A strain identical with the infecting strain was found in the nose of the patients about as often as in the throat—in spite of the fact that when swabs are taken from both sites in carriers, the throat swabs give a positive result at least twice as often as those from the nose. I stress this point in order to call attention to the danger of the handkerchief—both of patients and attendants. Anybody with haemolytic streptococci in the nose must inevitably, by handling the handkerchief, transfer this organism to his or her hands at frequent intervals in a very sticky medium.

6. From a careful scrutiny of the combined serological and epidemological data Dr. Dora Colebrook considers it probable that of the 48 patients for whose infection a possible source was found, six did actually contract their infection from their own extra-genital strain, 24 from an attendant, and nine from a member of the mother's household. In nine cases the evidence did not warrant a definite opinion.

7. The last point to which I want to call attention is this. F. Griffith has recently shown[16] that most of the haemolytic streptococci which give rise to infections of the respiratory tract, scarlet fever, tonsillitis, etc., fall into some 10 to 20 types distinguishable by their serological reactions. There is not an infinite variety as seemed possible at one time. Dr. Dora Colebrook has shown that the same applies to puerperal fever strains. Thirty-four per cent of them fell into 11 types and—this is the significant fact—the 11 types are those commonly found by Griffith in the acute infections of the respiratory tract.

(It is of interest to note, in parenthesis, that this last finding may prove of considerable importance some day if we discover an effective specific treatment for infections by haemolytic

streptococci. As in the case of pneumococcal infections it may well be that such a treatment will have to be appropriate to the particular type of streptococcus.)

I have now come to the end of my survey of what is known about the extra-genital sources of infection. Our knowledge is admittedly not complete. In particular we do not know as much as we should like to about the actual steps by which the streptococcus is conveyed from its source to the genital tract.

Standing a little away from the data I have outlined, one can discern three main conclusions upon which we should base our policy for the prevention of puerperal infection. They are: (*a*) That the haemolytic streptococci of the respiratory tract constitute the chief menace in maternity work; particularly those streptococci associated with recent acute infection of the respiratory tract. (*b*) That the healthy carrier, i.e. the person whose pharynx harbours haemolytic streptococci but does not show any sign of inflammation, is less to be feared than the individual with an acute infection, but nevertheless he sometimes is the cause of puerperal sepsis. (Our knowledge about the healthy carrier is not by any means complete. With further experience we may learn that the healthy carrier who transmits infection is really one who has recently had a slight inflammation of the pharynx). (*c*) That the danger of invasion by haemolytic streptococci threatens the parturient woman, not from one direction, but from many. We have to take into consideration the respiratory tract of those attending her confinement, her own nose and throat, and those of the members of her household; and we have also to be on guard against infection conveyed, directly or indirectly, from some other septic focus, at times, perhaps, by the agency of air-borne particles.

You will notice that I have placed infection from septic foci, other than those of the respiratory tract, last on the list. The surgeon would probably have put them first, and perhaps rightly so, because his cases are very frequently exposed to this risk in surgical wards of hospitals. In obstetrics, the situation is different—maternity wards and private houses are normally free from septic infection. It is because of this fundamental difference that I think our preventive measures require to be re-examined and re-cast. The danger of the respiratory tract streptococci, rather than those of other septic foci, should be in the front of the picture.

Suggested Measures for the Prevention of Infection by Haemolytic Streptococci.

A very little reflection on the conclusions just stated will show that we cannot hope to effect any large reduction in the puerperal sepsis rate without taking a good deal of trouble and spending a certain amount of money. Before I outline my suggestions it may be well to ask, Is there really a strong case for this trouble and expense? or ought we to philosophically accept the present casualty rate in midwifery as being somewhere near the irreducible minimum?

The present position is roughly this; casualties from infection represent nearly 50 per cent of the total deaths directly associated with childbearing, if those due to abortion are included, and, in addition, there is a large amount of serious non-fatal illness. The devastating epidemics of maternity hospitals have practically disappeared, but small epidemics, involving, say, two to 10 cases, are still not uncommon. Sporadic cases, however, comprise the larger proportion of our present-day sepsis. I estimate that the actual number of deaths per annum in England and Wales which are attributable to puerperal infection by the haemolytic streptococcal is about 1,200 to 1,500; and the number of serious non-fatal illnesses due to such infection, at least 6,000 or 7,000. Frequently these distressing illnesses last for many weeks. Further, I think it would be unwise to assume that serious epidemic sepsis will never return. The heavy death-rate from haemolytic streptococcus infection during the influenza pandemic of 1918, and the more recent experience in Brighton and Hove (1930), should serve as a warning of what may happen if the haemolytic streptococcus should some day acquire a greater virulence for man than it has at the present time. With our present lack of any defensive organization against those infections such an eventuality might well have disastrous results. In face of this possibility, and the probability that we could save a large proportion of the maternal deaths now occurring each year, I would submit that there is a strong case for energetic action.

The epidemic sepsis of former times was got rid of by scrupulous care about antisepsis, care which adds enormously to the tedious routine, and the expense of maternity work. To get rid of the sporadic sepsis we see to-day—and the small epidemics, will not require any appreciable addition to the daily routine, but it will involve our being much more wide awake when circumstances of special danger arise and in the anticipation of those special circumstances.

Since danger threatens from so many directions, complete safety can only be achieved by making the parturient woman immune to the risk of infection by haemolytic streptococci. We are working towards that ideal all the time, and I would not say that it cannot be attained. Progress has been made, but I cannot see any prospect of complete success within the next few years. For the present there is much more hope in the policy of preventing access of the streptococcus to the woman in labour. How are we to carry out that policy?

The suggestions I have to make come under two headings, namely, administrative reforms, and reforms in the conduct of labour.

Administrative Reforms.

What is most urgently required, as I see it, is a carefully thought-out and organized plan for preventing the exposure of any parturient woman to the risk of infection by haemolytic streptococci of the respiratory tract, either of herself or of an attendant, or of some other contact. Our arrangements at present are much too casual. Public Health Authorities have made recommendations from time to time (*vide* Interim Report of the Departmental Committee on Maternal Morbidity and Mortality)[23] but, with few exceptions, they have done little to facilitate the carrying out of these recommendations.

The campaign, as I see it, would have to include the following provisions:

(*a*) We want arrangements made in advance for the prompt detection of the catarrhal and inflammatory conditions of the respiratory tract due to haemolytic streptococci among the whole of our midwifery personnel *before they have caused puerperal infection or disseminated the streptococci.* There is only one way in which this can be done, namely, by the prompt examination of throat and nose swabs from all midwifery attendants, doctors, nurses and midwives, who develop tonsillitis or the minor degrees of sore throat, laryngitis, nasal sinus, or middle ear infection. Although the common cold in its typical form and true influenza are not due to the haemolytic streptococcus, infection by that organism may sometimes complicate these conditions or may, by itself, produce a very similar group of symptoms. Quite recently I saw a case of severe puerperal infection which was apparently attributable to delivery by a doctor who had what seemed to be a cold, but which was in fact an infection by haemolytic streptococci. It is certainly

desirable, therefore, that colds and influenza occurring among those doing midwifery should also be regarded with suspicion and be bacteriologically investigated.

An absolute rule cannot be laid down as to whether the subjects of such catarrhal infections should cease to do maternity duty pending the arrival of the bacteriologist's report—that must depend a little on circumstances, and on the probability or otherwise that the catarrhal infection is due to haemolytic streptococci. Very frequently the bacteriologist will be able to report within 24 hours that the swab is negative, or abundantly positive, but sometimes he cannot give a final report within three or four days.

Again, an absolute rule cannot be laid down as to the action to be taken on the bacteriological findings. If the swab has given an abundant culture of haemolytic streptococci the course is clear —the individual concerned must cease to do maternity work until the infective condition has cleared up and further swabs show few or not any haemolytic streptococci; and meanwhile, whenever possible, he or she should not continue to live among those engaged on such work. If, on the other hand, the bacteriologist reports few haemolytic streptococci or a moderate number but of definitely a typical character, it is improbable that the catarrhal condition is due to that organism and, if the clinical condition permits, the individual concerned may be allowed to continue his or her work provided a mask is worn.

With regard to this proposal, I shall perhaps be told that there has long been a rule in many maternity institutions that any nurse with an inflammatory condition of the nose or throat should report to the matron and be taken off duty. But does this happen with any regularity? And do we exercise a similar precaution with regard to the medical officers in institutions and the doctors and nurses and midwives engaged in private practice?

Before passing on I want to make it quite clear that I am *not* advocating here a routine swabbing at regular intervals of all the personnel of the maternity services in order to detect the healthy carriers of haemolytic streptococci. Such a course is called for occasionally when an epidemic occurs, but not otherwise, because it is neither feasible nor necessary to suspend all healthy carriers from maternity work.

(*b*) The second provision we must make is for the immediate recognition of puerperal infection by the haemolytic streptococcus when it occurs, and the detection of a likely source or sources

among the attendants in order that further infection may be prevented. Here again I am preaching what is already practised by a few but certainly not by the many.

In detail what I advocate is as follows:

Whenever, and as soon as, a rise of temperature to 101°F. or over occurs, within a few days of delivery (in the absence of clear indications of some acute infection remote from the genital tract) a swab should be taken from the upper part of the vagina or cervix and sent for examination. Almost invariably, if the fever is due to definite genital tract infection by haemolytic streptococci, the bacteriologist will obtain an abundant growth of this organism and be able to give a provisional report within 24 hours. Further swabs should then be taken from the mother's own nose and throat, and from the nose and throat of all those who attended her during delivery and the puerperium. Any attendant whose swab gives an abundant culture of haemolytic streptococci should be temporarily suspended from maternity work and cease to associate with other people doing such work. (In the case of the maternity nurse looking after a mother in her own home, she can of course be allowed to continue her duties during the puerperium, but should not have charge of the baby. Before undertaking a fresh case she must ascertain that she is no longer a carrier.) It is only by taking prompt action of this kind when the first case occurs that we can hope to prevent the development of second and third cases that is all too common at present, and the dislocation of work which that so frequently entails—quite apart from the loss of life. If my recommendation were commonly acted upon it would mean, I know, the examination of so many swabs from cases which did not prove to be infected by the haemolytic streptococcus, but surely that would be far better, and also far cheaper in the long run, than allowing our present sepsis rate to continue. Our experience at Queen Charlotte's Hospital shouts aloud of the tragic waste of life resulting from reluctance to act promptly at the first warning.

It will be noted that in the above recommendation I have advocated immediate search for any individuals who may have been the source of the mother's infection and may be dangerous to other cases, but not a complete investigation, such as Dr. Dora Colebrook has carried out, to establish with probability that the infection did come from one particular extra-genital source. An investigation of this latter kind may require days or weeks of work, and in institutional cases will often end only by showing that several contacts were carrying the infecting strain, so that the

ultimate source cannot be determined. It is not, therefore, to be recommended as a routine procedure.

Before leaving this question of bacteriological aids to the prevention of sepsis, may I anticipate a criticism which is perhaps taking shape in some of your minds. These proposals may seem to you admirable on paper but quite impracticable. I think that need not be so. I estimate that a maternity unit conducting say, 1,000 deliveries a year, with a total staff of 45 persons, would send on an average not more than four swabs per week—at a cost which need not exceed £30 to £40 for the year *(vide* (*e*) infra) and would usually be much less. Such an outlay would be much more than compensated for by the saving of trouble and expense incurred in connexion with septic infections.

(*c*) Arrangements should be made for the prompt removal of every infectious case from maternity institutions unless these are provided with an entirely separate septic block with a separately housed nursing staff. It is not safe to rely on mere isolation in a separate room of a lying-in institution or nursing home. The nurse in charge may become a carrier and disseminate haemolytic streptococci through the nurses' quarters. Apart from this possibility, the knowledge we now have of air-borne infection which can be transmitted by air currents, on clothing, and so on, makes it quite indefensible to retain infected cases in the lying-in home. More provision should, therefore, be made for the reception of these cases in appropriate special hospitals; and more use made of those which already exist.

(*d*) Provision should also be made against infection of the mother from her own nose or throat, or from a member of her household. To this end the patient should be specifically warned, without duly alarming her, in the antenatal period, against the risk of handling the vulva after labour pains have begun; and also advised to report the occurrence of any acute infections occurring in her household during the last few weeks of pregnancy. When necessary, such infections should be bacteriologically investigated and suitable action taken to prevent the mother's delivery in a streptococcus-infested environment.

(*e*) If swabs are to be commonly taken for preventive purposes as suggested in (*a*), (*b*) and (*d*) *supra*, some organization of bacteriological services will need to be arranged in order that the swabs may be dealt with promptly, cheaply, and on a uniform system. We need, in fact, a Puerperal Fever Prevention Service. What has been done for diphtheria and venereal disease can surely be done also for these costly streptococcus infections.

The development of such an organization is evidently a matter for discussion. One practical difficulty which would have to be considered is this: The recent, and somewhat rapid, development in the differentiation of the haemolytic streptococci[5, 8] has led to some confusion among bacteriologists whose work is general and who cannot be expected to be *au fait* with the latest refinements in every department of bacteriology. In a campaign for the detection of likely sources of puerperal infection such as has been outlined above, discrimination would frequently be called for between the dangerous, Group A, strains of haemolytic streptococci and the other varieties which are very often present in the throat, nose, stools and vagina.[24] At the present time that discrimination, though feasible in the hands of the few who spend all their time on the study of these organisms, presents too many technical difficulties for it to be adopted as a routine procedure in all laboratories.

In order to avoid the possibility of misjudgments by bacteriologists not quite familiar with these difficulties, there is much to be said for the concentration of the preventive work in a few centres. It should be possible to make such centres almost self-supporting by a small charge provided that Public Health Authorities, maternity units and private doctors made full use of the facilities afforded. There would not seem to be any reason why the same organization should not be made available also outside the sphere of obstetrics; e.g. for the control of sepsis due to haemolytic streptococci which is so frequently a source of trouble in general hospitals and in ear, nose and throat hospitals. The dispatch of swabs from a distance through the post does not present any insuperable difficulty, since the haemolytic streptococcus will almost always survive on a swab for at least 48 hours, usually much longer, if the tube is corked to prevent excessive drying.

(*f*) I come now into difficult country. The measures I have just outlined aim at the removal of potential sources of infection from the parturient woman. I want next to suggest arrangements which seek to ensure that delivery shall not take place in an environment which is, or is likely to be infested with streptococci.

In view of the great variety and frequency of infections by the haemolytic streptococcus the homes of the poor must very commonly provide such an environment. Dr. Dora Colebrook's investigation indicated that in about 20 per cent of her cases the mother's infection was probably derived from a member of her

household. And the experience on Queen Charlotte's District over a period of five years lends support to this conclusion. During all that period the risk of developing a haemolytic streptococcal infection has been 30 per cent to 40 per cent higher for any booked case delivered in her own home than it is for similar booked cases delivered in Queen Charlotte's Hospital; and this, in spite of the fact that in the hospital we work under great disadvantages, having to deal with many emergency cases, often infected before admission, and not having any means of segregating them.

I am sure that, whereas the risk of sepsis in well-conducted maternity hospitals is growing less and less, and will continue to do so as knowledge increases, we shall never have adequate control over the manifold dangers of familial infection in the overcrowded homes of the poor. I am glad, therefore, to see the tendency for more hospital deliveries and I think we should encourage and facilitate that movement.

(*g*) My next point is bound up with this last. If we are to encourage institutional midwifery we must make sure that the institutions themselves are not likely to provide a streptococcus-infested environment.

As I understand it, maternity cases are received at present into several kinds of institutions viz: (*a*) maternity hospitals; (*b*) maternity departments attached to general hospitals; (*c*) private maternity homes; (*d*) nursing homes taking only maternity and medical cases; (*e*) nursing homes taking surgical as well as maternity and medical cases.

In the light of the knowledge we now have about potential and likely sources of infection I think it would be well to ask ourselves which of these several kinds of institution is likely to be the most safe; whether the admission of maternity cases to any of them is definitely undesirable; and whether any changes in the conduct of them are required. Such an enquiry might have an important influence upon the sepsis rate of future years.

I am not qualified to discuss all these questions, but should like to offer one or two points for your consideration.

The maternity hospitals and homes should give the greatest margin of safety, provided that they have an adequate number of labour wards and accommodation for the immediate segregation of febrile cases and of any member of the staff with an acute infection of the respiratory tract.

The practice of having maternity departments attached to general hospitals seems to me to involve some risk, unless the

medical and nursing staffs of the maternity departments live quite apart from those of the rest of the hospital, which I imagine is rarely or never the case. Apart from laxity in administration which permits the going to and fro of nurses and doctors between a surgical and a maternity ward (I have known such a thing happen in a London hospital within the last year or two), can we exclude the possibility that nurses or doctors from surgical wards will convey streptococci on their clothing or their hands to those employed in maternity wards; and can we be sure that contaminated dust will not find its way from one to the other by air currents, or by cleaners when dusting and sweeping?

The above considerations seem to me to be still more pertinent in the case of nursing homes taking surgical and medical as well as maternity cases, indeed I cannot help feeling that it is very difficult to justify the admission of maternity cases to such institutions. Although I am sure most of them are well conducted and scrupulous in their provisions for safety, my experence leads me to doubt whether that can be said of all of them, and whether there is not need for some tightening up of the regulations governing them. I understand that at present in certain administrative areas the occurrence of puerperal pyrexia or puerperal fever in a maternity hospital or a nursing home is not notified direct to the Local Supervising Authority unless the proprietor of the home is a certified midwife; and that, in fact, such notification frequently reaches this Authority only after considerable delay, *via* the practitioner and the Local Sanitary Authority. In the meanwhile the appropriate measures to prevent further infection may or may not have been taken. In any case, apart from the threat of cancellation of the home's registration, I believe the Local Supervising Authority has not any power to ensure that such appropriate measures are taken.

Not long ago an obstetrician was called to see a typical case of streptococcal infection in a nusing home, the record of which was not too good. He asked the matron what the authorities were likely to do about such an occurrence. She replied, "Oh! they will come in a week or two and make a few enquiries, but they don't worry us much."

Would it not be in the interest of the patients of such institutions, that immediate notification of all pyrexial cases should be made direct to the Local Supervising Authority; and that this authority should have reasonable powers to ensure that in the conduct of these nursing homes the necessary regulations for safety are strictly complied with?

(*h*) The other administrative reforms which seem to me very desirable may be only briefly mentioned. One is the discontinuance, wherever and whenever possible, of the present system whereby maternity work is conducted by district nurses who are also responsible for the dressing of wounds and attendance upon all sorts of infected cases. The other is the better education of all those engaged in midwifery as to the multiple sources of puerperal infection, and in sound principles of antisepsis. My impression is that teaching about antisepsis in the past, both to medical students and to nurses, has been rather slip-shod. There has been, perhaps, too much rule-of-thumb and too little understanding.

Suggestions with regard to the Conduct of Labour.

You will have noticed that, although I spoke at some length about the sources of infection by haemolytic streptococci, I said very little about the journey of the streptococcus from the various outside sources to the genital tract of the mother. We know very little, and can only speculate as to whether the microbe is usually carried on droplets from the throat, or in particles derived from dried secretions, or directly by hands, or by the water with which the mother is washed, or by linen, or by some other agency as yet obscure.

Our speculations will probably lead us along somewhat different paths, but perhaps most of us will agree as to the first and last steps of the journey, i.e. that when the streptococcus comes from the respiratory tract it is probably borne on particles of some sort; and that when it arrives on the mucous membrane of the vagina or the skin of the vulva it probably does so by the agency of something which comes into contact with those structures—by hands, instruments, or pads, during or shortly after labour.

Assuming that measure of agreement, I hope we shall further agree that our preventive efforts ought to be concentrated on intercepting the journey of the microbe at both these points, namely, at its exit from the respiratory tract, and at its entry into the genital tract. The first of these tasks clearly raises the question of masks—how much we may expect of them and whether there is anything against their use? I, personally, expect of masks, if constructed so as to be efficient, that they will prevent the transfer from the healthy nose or throat carrier and the much more common infection from the inflamed throat carrying haemolytic streptococci. They will inevitably fail to

prevent transfer of the streptococci from the infected nose by way of the handkerchief.

Moreover, it should be clearly recognized that the mask can be a danger as well as a safeguard if it is handled by an unintelligent, careless person, or if, as I am told sometimes happens, it is used to justify continuance on duty of a person who has a respiratory tract infection and ought to be off duty.

I would sum up my attitude in this way: I regard the wearing of a mask as an entirely reasonable and valuable precaution which should be generally adopted by all who have been adequately instructed in its use, and I would strongly urge that all those being trained as maternity nurses and midwives, as well as medical students, from now on should be so instructed. But let us also see to it that the masks themselves are efficient.

To intercept the streptococcus at the end of its journey we must look to our antiseptic technique. The possibility of air-borne infection, and recognition of the multiplicity of the sources of infection, lead me to emphasize again the view that for the maximum of safety we ought not to rely on a single act of disinfection, we need a lasting antiseptic barrier, particularly on the hands and the vulva.

Thorough washing with soap and water is perhaps the most important item in the antiseptic technique, since it not only gets rid of adventitious microbes from the skin of the hands, but also removes any microbe-infested matter lodged under and around the finger-nails and, by removing dried secretions, makes the task of any subsequent antiseptic application very much easier. But, two minutes after the most thorough cleansing with soap and water, the hands may be reinfected from the air or by contact with a contaminated surface. Surely, therefore, our margin of safety in midwifery must be very much greater if, after cleansing, we provide hands, vulva and instruments with a lasting antiseptic film which will kill any streptococci arriving on them from any source.

Some three years ago I demonstrated[25] that the xylenol preparation, marketed under the name of dettol, supplied a film of this kind, which could be relied upon to give a persistent antiseptic effect for two to five hours, according to the strength in which it was employed. I think we now have evidence as to how far the use of dettol in midwifery has been justified by results. For the past five years we have kept a very careful check upon our sepsis rate at Queen Charlotte's Hospital, by examining swabs from every febrile case, so that we are able to

say with considerable accuracy how many streptococcal infections have occurred in the hospital and among the mothers delivered in their own homes by the hospital's nurses.* Dettol, in the form of a 30 per cent cream, has been employed as a routine for the hands and vulva in hospital cases for the past two and a half years. During this period the incidence of infections due to all grades of haemolytic streptococci has undergone a reduction of more than 50 per cent when compared with a similar period immediately prior to the use of Dettol and, since there has not been any other change in antiseptic procedure, I think the improvement may fairly be ascribed to this factor. In the district, Dettol has been used as a routine for the past 20 months, and here again the incidence of infections due to haemolytic streptococci has dropped by more than 36 per cent when compared with a two-year period before dettol was introduced. In this case too there seems little reason to doubt that the improvement has been due to this change in antiseptic technique. If that is the case, we have good reason to hope that a considerable reduction of sepsis will follow the wider use of this antiseptic in the future.

You will be interested to know whether we have experienced any toxic effects either on the staff or among the 8,500 patients to whom the antiseptic has been applied. So far as I know, only one case has shown a definitely toxic effect. This was a case of placenta praevia; the vagina was plugged with gauze wrung out in 10 per cent dettol, as had been done in several other cases without ill-effect. The vaginal mucous membrane became oedematous and inflamed but the condition cleared up within three or four days. It transpired that the patient had an extremely sensitive skin which could not tolerate even ordinary soap. It is quite unnecessary to use a solution so strong as 10 per cent for plugging. In addition to this case, I have heard of several in which there has been some injury to the skin of the buttocks, due apparently to the patient's lying on sheets wetted with the *neat* solution. Nurses should be warned against this

* Owing to the fact that before 1935 we did not, as a routine, distinguish between Group A and other haemolytic streptococci grown from cervical swabs, the data given below comprise *all* febrile conditions from whom haemolytic streptococci were obtained. A certain number of mild infections associated with the presence of haemolytic streptococci other than Group A are known to be included in the figures for the dettol period, but it is presumed that an approximately similar proportion of these will have occurred in the pre-dettol period.

possibility but, personally, I do not see any reason to use dettol at full strength. The 30 per cent cream gives an ample margin of safety, is more economical, and will not run down on to the linen.

May I call attention to one point which is sometimes overlooked? Weak solutions of dettol, i.e. below 30 per cent, will not give the prolonged antiseptic effect which seems to me so desirable. After the hands have been treated with the strong solution therefore, they should not be repeatedly dipped in weak solutions—it is much safer to rely on the invisible film of strong dettol. If, and when, lubrication of the hands is required, the 30 per cent cream may very well be used for the purpose.

Before leaving the disinfection of hands I should like to put in a plea for applying dettol to the mother's hands as well as the accoucheur's. Haemolytic streptococci of the pathogenic type have actually been isolated from the hands of nearly four per cent of normal women[12], and I believe it is the common experience of obstetricians that the mother's hands are very apt to wander to the vulva during labour pains. Is it not reasonable, therefore, in addition to warning the mother, to apply such a very simple precaution as the application of Dettol cream to her hands every two or three hours?

My last point with regard to dettol is that while it is still a proprietary article, I am authorized by Messrs. Reckitt to state that its chief active ingredient is chlor xylenol, blended with certain volatile oils.

So much for an antiseptic measures. They constitute an enormously important part of our defensive organizations—but I think it would be a mistake to rely on them to the exclusion of other precautions. The past few years have taught us that when there is a streptococcal-infested environment, there are too many opportunities for infection to occur in spite of an efficient antispetic technique during the confinement. The mother's hands or an uninstructed neighbour may convey infection to her pad after labour is completed; her bedding and linen may become contaminated with streptococci from the air, or other sources. In view of these and other possibilities I think we cannot afford to neglect the other precautions mentioned above.

Before we leave this aspect of the subject, may I briefly remind you of one or two potential dangers which are apt to be forgotten—the mother's hand basin and towel, the water supply, particularly in country practice, and the linen sometimes used for wiping the buttocks; I have already

suggested[24] how the basin and the water should be sterilized. I mention the linen here because I am informed that it is the practice amongst the poor to collect old bits of linen from all sorts of sources when labour is due, and that these are by no means always boiled and so rendered safe.

The last point about the conduct of labour concerns the insidious danger of familial infections. This has been dealt with under Administrative Reforms above, but I would suggest here that it should be a part of the routine duties of the midwife, maternity nurse or doctor, at the beginning of a confinement, to ascertain by discreet enquiries and observations whether there is any likely source of infection in the mother's household; and to take the appropriate steps to meet such a danger. Since it seems possible that these familial infections may be acquired sometimes by the agency of infected dust, the practice of keeping the vulva covered as much as possible during labour is also to be recommended.

In this brief summary of the factors which seem to me likely to reduce our sepsis rate I have no doubt omitted many important items.

Perhaps the most important is the personal factor. We shall not get rid of these occasional disasters unless we can count upon a high standard of intelligent vigilance and conscientious work. The intelligent and conscientious person using only soap and water, but not masks or gloves, will probably get less sepsis than the careless, unconscientious, and unintelligent person using the best antiseptic we have and all the other devices. Making due allowance for human frailty, I believe we can reasonably hope to cut down infections due to haemolytic streptococci by at least 50 per cent, if we deliberately organize a campaign against the multiple sources of danger. I have already mentioned that in at least three hospitals in which a bacteriological examination has been carried out as a routine procedure in all febrile cases over a prolonged period, the number of infections by haemolytic streptococci has been almost completely eliminated. (D. Colebrook,[22] pp. 37–38.) At Queen Charlotte's Hospital, where our conditions are far from ideal, the number of infections by Group A haemolytic streptococci among 4,850 booked cases delivered in the hospital during 1934 and 1935 has been only seven, i.e. 1.4 per 1,000, or one in 693 deliveries.

I look forward to the time when every maternity unit will keep a conscientious record of all its haemolytic streptococcal

infections, and will be dissatisfied if there is more than one of these in every 500 booked cases delivered in the institution. That, I think, is a standard which can reasonably be expected. If attained it would mean a fall in the death-rate from streptococcal infections of something like 700 per annum in England and Wales alone; and a fall of 3,000-4,000 in the number of non-fatal cases of puerperal fever.

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[*The discussion on this subject at the Congress of Obstetricians and Gynaecologists at Belfast is on page* 771.]

Abdominal Myomectomy

BY

ARTHUR A. GEMMELL, M.C., T.D., M.A., F.R.C.S. (Edin.), F.C.O.G.

From the Department of Obstetrics and Gynaecology, University of Liverpool.

THE prototype of the operation of abdominal myomectomy is that of polypectomy. Hippocrates (450 B.C.) first described polypectomy, and although this operation was apparently neglected in the Middle Ages, it was re-described in the sixteenth century by Ambrose Parè. From this time onwards there is a progressive increase in the literature of this subject.

With the rapid extension in the number of autopsies performed in the seventeenth century knowledge of pathology increased, and Spencer Wells utilized the knowledge thus gained, that a fibroid is an encapsulated tumour, to perform vaginal myomectomy in 1863. The first abdominal myomectomy was performed by Chelins, of Heidelberg, in 1830, when he operated upon a patient for an ovarian tumour but removed a pedunculated myoma. As the knowledge and practice of antiseptic surgery grew, more attention was devoted to abdominal operations. Alexander[1], of Liverpool, in 1898, was the first, in this country, to publish a series of cases of abdominal myomectomy. He had performed the operation 11 times with three deaths, but probably only one death could be attributed to the operation. This paper at the time met with a good deal of strong adverse criticism. Since 1898 many papers have been written on the subject by gynaecologists in all part of the world.

The advantages claimed for the operation are that it relieves the patient of her symptoms without interfering with her menstrual or reproductive functions. In doing this it not only cures her physically, but does so without precipitating the unpleasant symptoms of the menopause and without the psychological disturbance occasioned by the knowledge that she is unsexed and rendered incapable of child-bearing. These

psychological considerations have been so well and so fully dealt with in earlier papers that they will not be dwelt upon here.

In addition, however, it must be shown that the advantages claimed are not conferred upon the patient by subjecting her to greater risks than attend other operations which equally relieve her of her symptoms, although they deprive her of her genital functions.

This paper is specifically devoted to abdominal myomectomy, because vaginal myomectomy so often means only the removal of a fibroid polypus without any disturbance of the uterine wall. In the published papers on vaginal myomectomy it is impossible to distinguish between the operations for the removal of fibroid polypi and those which are properly called vaginal myomectomies.

The material here considered consists of three parts.

1. A collection of cases treated by Liverpool gynaecologists. Pedunculated subserous fibroids and fibroids discovered accidentally during operations for other conditions have been excluded from this series.

2. The more recent literature, which has been to some extent selected to keep to the same type of case.

3. Answers received to a *questionnaire* sent to gynaecologists all over the world. The answers are referred to in the list of personal communications at the end of this article, and we wish to express our gratitude to the writers therein named for the considerable trouble they have taken in preparing them.

The symptoms of fibroid tumours which demand operation are not discussed. It is assumed that operative treatment is considered necessary, but that the choice of method has to be made.

Indications.

Table 1 sets out the opinions expressed on the indications for myomectomy.

The majority of authorities agree that the operation should be confined to women of child-bearing age, and many consider that it is only suitable when a relatively small number of fibroids exists. Bonney[24] does not consider the number of growths any contra-indication to the operation, and has removed as many as 125 from one uterus.

Eight authors specifically state that the uterus must be a reasonable organ at the end of the operation, but other authors state that the involutionary changes which take place in the organ after the operation are so remarkably complete that a

TABLE I.

Indication	No. of Authors	References
Age of patient: This usually means patients of child-bearing age. The upper limit of age is variously stated at from 35 to 50.	45	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16. P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19, P20, P21, P22, P23, P24, P25, P26, P27, P28, P29, P30.
Young patients who have not had any children.	2	P31, P32.
Number of tumours: The number of tumours stated varies from one to six. Some authors qualify this by stipulating that they must be subserous.	13	7, 8, 10, 17, 18. P1, P3, P6, P7, P20, P22, P29, P30.
That the uterus shall be a reasonable organ at the end of the operation.	10	10, 18, 19. P12, P15, P18, P25, P28, P29, P31.
That subsequent pregnancy shall be possible and desirable.	10	5, 6, 7, 8, 20. P6, P9, P17, P33, P34.
Conservation of menstrual function the most important factor.	4	15, 20, 21. P35.
The expressed wish of the patient to preserve function and (some authors) explanation that a secondary operation may be necessary.	11	6, 10, 13. P7, P8, P9, P13, P17, P18, P23, P36.
When fibroids are associated with prolapse at any age to facilitate operative treatment of the prolapse.	2	10, 14.
Decision only to be made when the abdomen is open.	4	12, 20, 22, 23.

much distorted organ quickly becomes normal. Leith Murray[28] had occasion to reopen the abdomen 20 days after a myomectomy and remove the uterus. The weight of fibroids removed at the primary operation had been 2 pounds 14 ounces. Yet 20 days later the uterus itself only weighed 5 ounces. My personal experience is that a rapid return to normal is usual, and consequently the size and shape of the organ at the end of the operation is of little importance.

Conservation of the function of menstruation is considered to be the most important factor by four authors. Salabar[21] goes so far as to say that he favours resection of the Fallopian tubes at the time of the operation for the removal of the myomata in order to avoid the danger of rupture of the scar in a subsequent pregnancy.

The opinion of four authors that the real decision can only be made when the abdomen is open is a wise reminder that it is unsound to promise a patient beforehand that her uterus can be saved. We have all met cases in which the number of fibroids found in the uterus was much greater than had been anticipated from physical examination.

Contra-indications.

The contra-indications to the operation are mainly the opposite to the indications, but as some additional points are raised, these too are presented in tabular form.

Gross malignant change in the fibroid itself, or in the genital organs, when present, would certainly be a contra-indication to conservative operation by all surgeons. Errors may arise when only early changes have occurred. Fortunately such findings are comparatively rare. Essen-Moller,[6] by careful examination of material from operations for fibroids during 20 years, found an incidence of 3 per cent of malignant disease in the genital organs associated with fibroids and not diagnosed before operation.

Authors who quote statistics for the occurrence of sarcoma in fibroids are:

	Case of fibroids	Sarcoma found	Percentage of sarcoma
Le Roy Brown[33]	1500	7	0.46
Weiss[31]	1125	1	0.09
Goullioud[34]	692	2*	0.28
von Wachenfeldt[35]	255	6	2.30
Labhardt[36]	1000	—	1.10

* "Malignant change" presumably sarcoma.

TABLE II.

Contra-indications	No. of Authors	References
Age of patient: Women past child-bearing age. Lower limit varies from 40 to 45.	9	7, 10, 22, 24, 25, 26, 27, 28. P17.
Number of tumours: Numerous tumours.	18	3, 4, 5, 7, 11, 14, 15, 22, 23, 26, 28, 29, 30. P12, P13, P14, P16, P33.
Size of tumours: Large tumours. Size variously stated from diameter of 5cm. to size of a 16-weeks' pregnancy.	8	3, 5, 15, 31. P17, P19, P21, P33.
Association with disease of the appendages.	16	10, 13, 14, 15, 18, 25, 28, 31, 32. P2, P7, P17, P19, P20, P27, P33.
Patients exhibiting serious anaemia or in whom haemorrhage is profuse.	5	10, 11, 26, 28. P17.
Malignant change or degenerations or when there is suspicion of malignancy of the corpus or cervix.	14	12, 13, 14, 18, 22, 24, 25, 26, 27, 32. P13, P19, P20, P37.
Multiparity or the desire of the patient not to have any more children.	3	P17, P18, P27.
The wish of the patient to ensure one operation only.	1	10.

Gidon[37] states that pedunculated fibroids of the fundus are specially liable to become malignant. He quotes 22 cases but the histological details are incomplete.

Bonney[24] has recorded a case in which he shelled nodules out from the uterus which proved to be sarcomatous. The patient died of a very rapid recurrence.

Leith Murray reported a case in which he shelled out a fibroid which had a sarcomatous core. Fourteen months later this

woman was delivered, without assistance, of a child at term weighing 6 pounds 4 ounces. Recurrence was noted 17 months after delivery and total hysterectomy with removal of both uterine appendages was performed. The patient was later treated with lead mallate but died.

Carcinoma of the body of the uterus is well recognized as occurring in association with fibroids. Weiss[31] reports this complication 11 times in 1,125 cases of fibroids (0.9 per cent). It was discovered by curettage in seven patients but in the other four by the microscope only. Labhardt[36] also found the conditions associated in 0.9 per cent of 1,000 cases. Therefore, when continuous bleeding is found in older women presenting the physical signs of a fibroid uterus, hysterectomy should be the treatment of choice.

Bonney[24] and Leith Murray[28] have stated that the non-malignant degenerations (oedema, hyaline, or red) are not of any importance in influencing the choice of myomectomy as the method of treatment. This is supported by the present Liverpool series in which, where pathological reports are available, hyaline change is reported 15 times, oedema 13 times, and red degeneration eight times, all in patients who recovered from the operation.

In order to convey some impression of the contra-indications adopted by the Liverpool group, it may be stated that concurrently with the 104 myomectomies here recorded, hysterectomy for fibroids has been undertaken for 123 patients aged 39 years or less. It has been possible to study the case records of 88 of these. The reasons recorded for resorting to hysterectomy are:

Large number of fibroids	18
Simultaneous inflammatory appendage disease ...	14
Tarry cysts of the ovaries	9
Cervical fibroid	7
Multiple fibroids and multiparity	3
Large size of the fibroid	2
Rapidity of growth	1
Marked anaemia	1
Multiparity	1
Bilateral ovarian growths	1
Unstated	31

Among the cases in which a reason was not stated for the hysterectomy, examination of the specimen after removal from one patient revealed the presence of an adenomyoma in the uterine wall.

TABLE III.

Operative technique	No. of Authors	References
Best time to operate is immediately after a period.	2	14, 19.
Routine pre-operative curettage to examine endometrium or to secure drainage.	5	14, 18, 19, 38. P38.
Pre-operative lipiodol radiology to show relation of tumour to cavity and prove tubal patency.	2	3, 15.
Uterine incisions:		
(*a*) In anterior wall whenever possible.	5	24, 28, P2, P8, P29.
(*b*) In midline of anterior wall.	4	1, 13, 40, P39.
(*c*) Directly over bulge of tumour.	2	18, 41.
(*d*) Right into fibroid in order to define capsule.	1	28.
(*e*) Burrow through uterine wall from primary incision to reach other fibroids.	7	5, 24, 28, 40, P2, P8, P29.
Control of haemorrhage:		
(*a*) Use clamps to main vessels or tie main branches of uterine arteries.	11	14, 19, 23, 24, 40, 42. P2, P8, P24, P25, P29.
(*b*) Do not use clamps; see haemorrhage and control it.	1	28.
(*c*) Suture placed half an inch beyond each end of incision of value in controlling bleeding.	1	14.
Opening of cavity:		
(*a*) Always open cavity when menorrhagia is a symptom.	6	24, 27, 28, P2, P8, P29.
(*b*) Avoid injury to endometrium.	2	18, 40.
(*c*) If cavity opened, disinfect it.	2	32, 40.
(*d*) If cavity opened, dilate the cervix.	2	38, P12.

TABLE III (*continued*).

Operative technique	No. of Authors	References
Capsule:		
(*a*) Capsule must be removed to avoid recurrence.	4	20, 43, P16, P27.
(*b*) Leaving part of capsule behind of no importance as long as no fibroid left.	3	8, 12, 41.
Excess of uterine muscle:		
(*a*) Trim away excess.	7	2, 24, P2, P8, P17, P19, P29.
(*b*) No need to trim away excess.	1	28.
Suturing:		
(*a*) Obliteration sutures in cavities tight enough to coapt but not tight enough to bleach.	2	14, 27.
(*b*) Peritoneal suture tight enough to bleach surface.	1	28.

Operative Technique

Four main principles in operative technique are generally accepted: (1) Strictest asepsis; (2) exact haemostasis; (3) careful closure of cavities; (4) complete peritonization.

Many devices are adopted to secure complete peritonization. As Bonney[24] remarks, there is here the greatest scope for the individual ingenuity of the surgeon. His "hood operation" is a valuable one for fairly large fibroids situated in the posterior uterine wall. Omental grafts and the utilization of the bladder peritoneum are mentioned, while it is sometimes helpful to bring the anterior wall of the uterus close to the anterior abdominal wall by some form of ventral fixation.

A summary of other points in technique which have been mentioned is set out in Table III.

From the smaller numbers of authors given against each item in this table compared with the previous tables, it can be assumed that the technique of all operators is covered by some combination of the various individual points noted.

In the Liverpool series here presented a special time in the menstrual cycle has not been chosen for operation. Pre-operative curettage has only been performed twice. In the great

TABLE IV.

Comparison of mortality statistics for hysterectomy and myomectomy for fibroids of non-pregnant uterus.

Author	Hysterectomy	Deaths	Per cent	Myomectomy	Deaths	Per cent
32	54	2	3.6	45	1	2.2
41	121	1	0.82	25	1	4.0
10	987	17	1.7	167	3	1.8
29	189	4	2.1	20	1	5.0
44	689	32	4.6	451*	44	9.8
20	738	15	2.03	†55, ‡69	1	0.87
28	535	8	1.49	137	1	0.73
46	1643	31	1.88	--§	—	—
47	—	—	—	886‖	7	0.78
23	49	1	2.04	42	1	2.4
48	536	18	3.45	158	4	2.5
Liverpool	522	13	2.48	104	4	3.8
6	1550	31	2.00	68	0	0
P13	212	3	1.40	18	0	0
P15	186	3	1.60	156	0	0
P30	686	24	3.50	43	2	5.2
P10	434	4	0.92	169¶	4	2.36
2	—	—	—	113	4**	2.5
49	—	—	—	6	0	0
24	—	—	—	403	7	1.70
15	—	—	—	20	1	5.00
40	—	—	—	9	0	0
25	—	—	—	12	0	0
34	—	—	—	118	4	3.40
26	—	—	—	48	0	0
50	—	—	—	101	2	1.98
51	—	—	—	77	1	1.30
42	—	—	—	13	0	0
43	—	—	—	200	1	0.50
14	—	—	—	81	1	1.20
19	—	—	—	128	1	0.77
52	—	—	—	4	0	0
21	—	—	—	40	2	5.00
53	—	—	—	60	2	3.30
54	—	—	—	13	1	7.70
55	—	—	—	97	3	3.00
56	—	—	—	112	0	0
P2	47	—	—	11	0	0
P3	106	—	—	34	0	0
P4	—	—	—	19	0	0
P7	71	—	—	11	0	0
P6	108	—	—	20	0	0

TABLE IV (*continued*).

Author	Hysterec-tomy	Deaths	Per cent	Myomec-tomy	Deaths	Per cent
57	—	—	—	150††	0	0
P11	—	—	—	71	1	1.4
P16	343	—	—	19	0	0
P14	175	—	—	112	0	0
P17	274	—	—	56	0	0
P25	189	—	—	58	0	0
P9	341	—	—	25	0	0
P29	3076	—	—	977	11	1.12
P40	—	—	—	105	2	1.90
P24	152	—	—	30	0	0

* Probably includes vaginal operation. † Myomectomy. ‡ Resection. § Mayo clinic. || Mayo. ¶ Combined abdominal and vaginal. ** In 146 vaginal and abdominal. ††Approximate.

majority of cases clamps have not been used on the main arteries. Possibly the number of recurrences might be reduced if more care were taken to remove all the capsule. Henkel[20] states that in his last 284 cases of fibroids he found adenomyoma in the capsule in 24.

Mortality of Myomectomy.

The safety of the patient is of prime importance in assessing the value of a particular procedure as an elective method of treatment. Table IV sets out the mortality for both hysterectomy and myomectomy in the treatment of fibroids.

This shows that the mortality for hysterectomy varies between 0.82 per cent and 4.6 per cent, or that taking the whole 9,343 cases of hysterectomy with 211 deaths, the percentage is 2.25. For myomectomy the mortality varies between 0 per cent and 7.7 per cent, or taking the whole 5,294 cases of myomectomy with 70 deaths, the percentage is 1.32. In this calculation Henkel's[20] figures are included as one death in 55 myomectomies. Hengge's[44] and Havlasek's[P10] myomectomies are excluded because they are for combined abdominal and vaginal operations. If these two authors' figures are included, the total number of operations is 5,914, with 118 deaths—a gross mortality percentage of 2.

I would express my sincere thanks to Mr. Caradog Jones, Senior Lecturer in Social Statistics in the University of Liverpool, who has investigated these figures very carefully for me

by dividing them into two groups and comparing one with the other. He is of the opinion that if the whole be regarded as a statistical "random sample" the average mortality may be taken as 1.32 per cent, and that in any given sample it is highly probable that the rate would not exceed 4–5 per cent at most. It will be seen then that 51 out of the 53 authors cited show a mortality rate within the expected statistical variation.

Keller and Bohler[45] collected statistics concerning myomectomy, but do not detail the sources of their figures. They state that most authors do not make it clear whether pedunculated subserous and intra-ligamentary fibroids are included in or excluded from their series. The same comment applies to many of the papers dealt with here. We believe that such cases should be excluded, as the operation is much simpler and is not attended by the same risks. Keller and Bohler's[45] collected figures show:—

	Cases	Mortality (per cent)
Sub-total hysterectomy	15,528	2.5
Abdominal total hysterectomy ..	11,406	4.5
Abdominal myomectomy	4,158	3.5

They further divide the figures to show the fall in mortality since 1918.

1918–1929

	Cases	Mortality (per cent)
Sub-total hysterectomy	4,575	1.9
Abdominal total hysterectomy ...	2,305	3.6
Abdominal myomectomy	1,030	1.6

It is worthy of notice that the mortality percentage in this collected series of myomectomies also falls within the expected statistical variation for a "random sample", while that for cases operated upon between 1918 and 1929 is approximately the same as that given for the average mortality in the present series.

In the preceding paragraphs wherever the mortality for hysterectomy is considered, no account is taken of the age of the patient at the time of operation, whereas, by consent,

myomectomy is rarely undertaken for patients over 40 years of age. In our series, the average age of the patients submitted to hysterectomy was 44.39 years, and that of patients submitted to myomectomy was 34.28 years. Therefore, it would appear more reasonable to compare the mortality of myomectomy with that of hysterectomy for fibroids in patients under 40 years of age. Cotte and Berard[32] are the only authors who quote figures of this kind—10 cases of hysterectomy in patients of under 40 with one death. In the Liverpool group's 123 hysterectomies for patients under the age of 40, there were three deaths, or 2.44 per cent. These figures are very small, but it will be seen that the percentage mortality for hysterectomy patients under 40 years of age only differs from that for hysterectomy at all ages by 0.19 per cent, and that myomectomy carries a 1.4 per cent greater risk in the hands of the Liverpool group.

The causes of death are recorded in some instances. In our series they were septicaemia, two; intestinal obstruction and ileus, one each. The following list shows all the recorded causes of death:—

INFECTIVE CONDITIONS	9
"Infection"	4
Septicaemia	3
Sepsis and ileus	1
Peritonitis	1
HAEMORRHAGE	4
Secondary haemorrhage	1
Haemorrhagic shock	2
Vaginal bleeding and ileus	1
EMBOLISM	3
GASTRO-INTESTINAL COMPLICATIONS ...	7
Paralytic ileus	3
Acute dilatation of stomach	2
Intestinal obstruction	2
PARTIAL NECROSIS OF UTERINE WALL ...	1

Assuming that this short list can be taken as representative, infective conditions are the most frequent cause of death, then gastro-intestinal complications, haemorrhages, and embolism in that order.

Effect on Menstruation.

Table V gives the details of the recorded effects of the operation on the menstrual function. The most important column is the last, in which it is stated the percentage of patients whose

TABLE V.
Menstruation.

Author	No. of cases	Menstruation normal	Menstruation abnormal	Per cent to cases	No. followed up	Per cent to follow up
24	396	200	10	50.5	210	95.2
40	9	3	—	33.3	3	100.0
10	164	67	16	40.8	83	80.7
25	12	12	0	100.0	12	100.0
34	114	—	—	100.0	—	—
14	81	—	—	over 90.0	—	—
19	127	86	8	67.7	94	91.4
15	8	8	—	100.0	8	100.0
28	136	103	1	75.7	104	99.0
50	60	28	—	46.6	39	71.0
23	41	41	—	100.0	41	100.0
56	120	—	0	—	31*	100.0
Liverpool	104	67	12	64.4	79	84.8
P6	20	11	5	55.0	20	55.0

P2. In three menorrhagia became normal.
P3. Subsequent menses normal.
P4. Not seen any subsequent complications.
P33. Usually relief of menorrhagia in properly selected cases.
P36. I dislike myomectomy if patient has prolonged excessive periods.
P8. Normal flow in most cases.
P7. Menorrhagia relieved in all cases.
P32. Menorrhagia improved.
P9. Menstruation becomes normal.
P12. Menses lessened.
P41. Effect on menstruation usually favourable.
P17. In every case menstruation has been re-established and has been normal.
P15. Effect usually all that can be desired. Occasionally dysmenorrhoea is not relieved and scanty menstruation may result if too much endometrium is removed.
P19. Menstruation after two months was normal.
P20. Subsequent menses normal.
P37. Effect on menstruation generally good.
P23. No effect or restoration to normal.
P25. Menses usually normal.
P27. Menstruation usually normal.
P30. Menstruation always conserved and normal.
P29. Usually curative of menorrhagia.
P35. Satisfied with the immediate results.
P14. Normal after fourth month.
P24. Menstruation apparently normal.

* Approximately.

menstrual loss is normal after myomectomy to the total patients followed up. This varies from 55 per cent to 100 per cent, but it will be noted that according to most authors it is over 80 per cent. This is supported by personal communications in which figures are not given, but in which, almost invariably, it is stated that menses are normal after the operation.

Subsequent Pregnancies.

The subsequent reproductive function is analysed in Table VI.

Bright Banister's[49] cases particularly illustrate that fibroids may be the cause of sterility and their removal by myomectomy be followed by the happiest results. All his six cases were operated upon solely in an attempt to relieve sterility and in each case he was successful.

Since the operation is undertaken for single as well as married women, and as circumstances outside the control of the gynaecologists may arise to deprive the married woman of the opportunity of motherhood, it is necessary to qualify the gross figures to assess the chances of subsequent pregnancy. Whenever possible the number of patients likely to become pregnant has been ascertained. This figure is 523 and of these 145 conceived, or 27.7 per cent. The percentage varies from 100 to 5. Of the patients who did become pregnant 128 gave birth to 133 living children, there were 17 premature labours and abortions and nine abnormal labours of which three were possibly due to the myomectomy.

All the factors concerned in sterility are not analysed in the published papers and, therefore, if approximately one quarter of the patients treated for fibroids later conceive, it is worth striving for such a result. Patients themselves sometimes nullify this attempt, as is shown by the fact that in this Liverpool series 12 patients are known to have practised contraception, in Leith Murray's[28] series nine and in Weiss'[31] experience "many".

The literature does not give us a guide as to whether there is any difference in a likelihood of conception after operation between patients who had conceived before and those who had not. Our own figures are really too small to furnish any sound deduction, but they suggest that there is not any difference, for of the 54 patients who were likely to conceive, 29 were sterile before operation and nine of these later conceived, whilst 25 had conceived before operation and of these nine also became pregnant after operation.

TABLE VI.
Subsequent pregnancies.

Author	No. of cases	Patients likely to become pregnant	Patients becoming pregnant	Percentage	Contra-ception	Abortion and premature labour	Normal labour	Abnormal labour	Total number of children
49	6*	6	6	100.0	—	1	6	—	7
24	—	77†	30	38.9	—	2	21	6‡	27
10	—	49	13	26.5	—	—	—	—	18
34	—	55	18	32.7	—	—	13	2	24
29	—	20	1	5.0	—	—	1	—	—
26	—	21§	10	47.6	—	—	—	—	—
6	—	49	6	12.2	—	—	—	—	—
28	—	84	23	27.3	9	7	16	—	16
52	—	8	4	50.0	—	—	—	—	7
53	—	39	6	15.4	—	4	3	—	3
35	—	29	2	7.0	—	—	1	—	2
P6	—	17	3	18.0	—	1	2	—	2
P16	—	14	4	29.0	—	—	4	—	4
Liverpool	104	54	18	33.3	12	2	17	1	22
58	20	—	3	—	—	—	—	—	—
40	9	—	1	—	—	—	—	—	—
59	1	—	1	—	—	—	—	1‡	—
25	12	—	4	—	—	—	3	1‡	—
20	124	—	4	—	—	—	4	—	4
51	77	—	8	—	—	—	—	—	—
47	909	—	46	—	—	—	—	—	38
19	69	—	21	—	—	—	—	—	27
54	13	—	1	—	—	—	—	—	4
23	41	—	2	—	—	—	2	—	4

TABLE VI (*continued*).
Subsequent pregnancies.

Author	No. of cases	Patients likely to become pregnant	Patients becoming pregnant	Percentage	Contra-ception	Abortion and premature labour	Normal labour	Abnormal labour	Total number of children
P19	169	—	1	—	—	—	1	—	1
31	224‖	—	23	—	Many	—	—	—	—
56	120	—	12	—	—	—	—	—	—
P2	11	—	2	—	—	—	2	—	2
P23	10–15	—	3	—	—	1	2	—	2
P30	43	—	1	—	—	—	1	—	1
P43	41	—	1	—	—	—	—	—	—
P37	—	—	30%	—	—	—	—	—	—
P3	Subsequent pregnancy and labour normal.								
P33	Fertility is somewhat restored.								
P8	Effect on subsequent pregnancy disappointing.								
P31	Myomectomy has been followed by pregnancy in two cases.								
P12	Two or three conceptions followed.								
P41	Few conceptions.								
P15	Has the impression that number becoming pregnant is not low.								
P20	Subsequent pregnancies extremely rare.								
P25	A few have conceived.								
P27	Pregnancy seems relatively infrequent after myomectomy.								
P29	Pregnancy may occur.								

* All operated upon for sterility only.
† Operations upon pregnant and non-pregnant patients not separated.
‡ Abnormal labours not due to myomectomy.
§ Patients under the age of 35.
‖ Combined abdominal and vaginal myomectomies.

The time elapsing between the operation and the birth of a child in our series is as follows:

Time elapsed	Number of patients
12 months	1
14 months	1
15 months	1
18 months	1
2 years	6
3 years	2
3½ years	1
Not stated	5

Obections to the Operation.

The usual objections to myomectomy are its high morbidity, the danger of rupture of the scar in subsequent pregnancies and the recurrence of fibroids.

High Morbidity.

Apart from statements that the morbidity rate is high there is nothing in the literature to support this contention. Miller and Tyrone[19] state that four of their 127 cases had intestinal obstruction at some later date and all recovered after operative treatment. Among the 104 of the Liverpool group there was one patient who had obstructive symptoms but these yielded to treatment without operation becoming necessary.

Post-operative temperature and its duration is the only other criterion and the following statement of Salabar's[21] cases and 78 cases of our own, in which the temperature charts were available, form the only record. The only reason for the particular temperatures mentioned is to bring our cases into exact line with those of Salabar. His are, of course, shown on the centigrade scale in the original paper.

Maximum post-operative temperature

	Salabar	Liverpool
Apyretic	1	17
99°F. to 100.4°F.	17	52
100.4°F. to 102.2°F.	16	8
Over 102.2°F.	4	1

|| Combined abdominal and vaginal myomectomies.

Return to normal temperature

	Salabar	Liverpool
Apyretic	1	17
1 to 3 days	4	27
4 to 6 days	12	22
7 to 9 days	5	7
10 to 12 days	5	2
13 to 15 days	1	2
Over 15 days	6	1

The numbers in both groups are small and do not give the same picture. The Liverpool group shows that the maximum temperature rarely exceeds 100.4 deg. F. and has usually returned to normal by the sixth day. This compares favourably with the convalescence after hysterectomy.

Rupture of the Scar in Subsequent Pregnancy.

This complication is always quoted as a serious risk of the operation. There has not been any such accident in our own series, but there has been one case in the Liverpool Maternity Hospital in recent years, in which the myomectomy had been performed by another surgeon.

There are remarkably few references in the literature. Goullioud[34] in 74 myomectomies reports three ruptures, and one of these patients died. Hartmann[92] in 20 myomectomies reports one rupture. Hurd[60] records a case of rupture in which the myomectomy had been performed 13 months before delivery. Keller and Bohler[45] mention three cases, one each of Döderlein, Frankenthal and Koenig. Huggins[50] had seen two cases in 25,000 deliveries.

Thus 11 cases are recorded but there is not any information available on which to form an opinion of the frequency of this serious accident. In view of the large number of operations recorded it must be very infrequent.

Recurrences.

The danger of recurrence and the possible necessity for a further operation is urged as an argument for hysterectomy instead of myomectomy. As evidence that sub-total hysterectomy does not always prevent recurrence we would mention

TABLE VII.
Recurrences.

Author	Cases	Number of recurrences	Percentage	Number followed up	Percentage recurrences to follow-up
24	403	8	1.98	210	3.80
10	167	5	3.00	93	5.37
25	12	0	0.00	12	0.00
47	909	13	1.43	504	2.57
28	137	3	2.19	104	2.88
21	40	1	2.50	7	14.28
53	60	5	7.99	45	11.11
P6	20	0	0.00	20	0.00
Liverpool	104	7	6.70	80	8.75
19	128	—	—	94	3.08
5	20	1	5.00	—	—
34	118	10	8.47	—	—
29	20	1	5.00	—	—
26	78	9	11.50	—	—
51	77	4	5.20	—	—
14	81	2	2.47	—	—
6	49	9	18.37	—	—
52	8	2	25.00	—	—
23	41	1	2.40	—	—
56	120	0	0.00	—	—
31	224	17	7.59	—	—
P2	11	0	0.00	—	—
P32	8	1	12.50	—	—
P12	50	0	0.00	—	—
P15	156	0	0.00	—	—
P16	19	0	0.00	—	—
P17	56	0	0.00	—	—
P19	169	1	0.59	—	—
P14	112	2	1.78	—	—
P40	105	0	0.00	—	—
P8	—	—	20.00	—	—
P20	—	—	about 25.00	—	—
P23	—	—	about 50.00	—	—
P27	—	—	less than 10.00	—	—

P36 Many recurrences.
P11 Recurrence after removal of sub-mucous myomata is rare.
P41 Recurrence hardly ever occur.
P37 Recurrences very seldom occur.
P22 Recurrences not frequent.
P25 Occasional occurrence seen.
P30 No recurrence in the last 10 years.
P29 Occasional recurrences.

that we have seen two cases of fibroids growing from the cervix after a sub-total hysterectomy. In one case the recurrence occurred six years after the hysterectomy and the fibroid, when removed, weighed nine pounds.

Table VII gives details of recurrences following myomectomy. The important column is the last. In this column is given the percentage of recurrences to cases followed up, and it will be seen that this varies from nothing to 14.28 per cent.

The only method of estimating the likely rate of recurrence is by a consideration of the first nine sets of figures in Table VII. This shows a total of 1,748 patients, of whom 1,075 were followed up and 42 recurrences found. This is almost exactly 4 per cent. Mr. Caradog Jones has also examined these figures very thoroughly from a statistical standpoint. Assuming that the chances of discovery of the recurrences are always the same, he is of the opinion that they show an average recurrence rate of about 4 per cent, and that the deviation is such that 8 per cent represents the upper limit. A recurrence rate exceeding 8 per cent would be exceptional, and there would be some special reason to account for it such as the selection of patients for the operation, the age of the patient, the completeness or otherwise of the follow-up and so on.

Obviously several factors have to be considered in determining recurrence rate, especially the age of the patient at the time of the original operation, the length of time over which patients are followed up, and the thoroughness with which all seedlings are searched for and removed at the primary operation.

Table VIII gives the ages of patients at the time of the primary operation, and also the time after this operation at which the recurrence was found, where these are known.

The age at the time of the primary operation is striking. Of the 18 cases, 11 are in the age group 29 to 33. This supports Bonney's[24] statement that the nuclei of all fibroids are laid down by the time the patient has reached the age of 30 or but little over.

The time at which recurrence occurs is summarized thus:

Within 2 years	7
Within 2 to 5 years	18
Within 5 to 10 years	9
Within 10 to 15 years	3
Within 15 to 20 years	0
Over 20 years	1

TABLE VIII.

Author	Age at time of operation	Date of appearance of recurrence.
24	19	2 to 5 years later.
24	23	2 to 5 years later.
Liverpool	25	5 years later—hysterectomy.
24	29	2 to 5 years later.
28	29	10 years later.
24	29	8 years later.
24	30	Conceived, and then had hysterectomy performed.
28	30	3 years and 5 months later.
30	30	10 years later. Hysterectomy 5 years after recurrence noted.
Liverpool	31	1 year later—myomectomy, followed in another 10 months by radium.
21	32	3 years later. Symptomless.
Liverpool	32	6 months later—myomectomy.
Liverpool	33	1 year and 6 months later—hysterectomy.
Liverpool	33	6 months later—hysterectomy.
Liverpool	34	4 years and 9 months later—hysterectomy.
Liverpool	35	2 years later—myomectomy.
28	36	4 years later.
24	36	Conceived, and had Caesarean section performed, with myomectomy, 8 years later.
5	—	One case 5 years later.
P32	—	One case 2 years later.
10	—	Two cases 1 to 9 years later.
34	—	One case 22 years later.
29	—	One case 1 year later.
26	—	One case 3 years later, one case 4 years later, one case 5 years later, one case 6 years later, one case 7 years later, and two cases 10 years later.
61	—	One case 5 years later (in cervix).
47	—	13 cases, mainly 5 or more years later. One case 13 years later.
52	—	One case 5 years later (with carcinoma of the cervix), one case 7 years later.
53	—	Two cases 1 year later, one case 5 years later, one case 7 years later, and one case 8 years later.
23	—	One case 1 to 5 years later.
P30	—	No recurrence in last 10 years.

The preponderance of recurrences in the 2–5 year period is note surprising in view of the facts that most patients who are submitted to myomectomy are in the mid thirties at the time of operation and that fibroids are tumours which grow during the period of active sexual life.

Myomectomy during Pregnancy.

Modern practice does not favour interference with fibroids during pregnancy except for a few special indications, and consequently the recorded number of myomectomies during pregnancy is much less than that in the non-pregnant state. These are set out in Table IX

This table shows a total of 475 cases with 14 deaths, a mean percentage mortality of 2.94; which is rather higher than the figure for patients operated upon in the non-pregnant state. Of the 461 mothers who survived, 284 had living children (61.3 per cent) and 65 miscarried (14.04 per cent). The pregnancy was removed at the time of the operation in 16 patients, seven had extra-uterine pregnancies, three had hydatidiform moles, in two patients the ovum was known to be dead at the time of the operation, and in 84 cases in which the pregnancy continued the resulting labour is unknown. Of the 284 children born alive, two died. Thus the 349 patients whose pregnancies continued after the operation are known to have 282 living children (80 per cent). In the majority of cases the labour was described as normal, and when it was abnormal this was never considered to be due to the myomectomy.

The time in pregnancy at which the operation is undertaken may be one factor in determining abortion. The figures available on which to assess this are very small, but they suggest that the risk is at its lowest in the fourth and fifth months of pregnancy.

TABLE IX.

Month	Operations	Abortions	Percentage
Second	16	7	43.75
Third	31	7	22.60
Fourth	32	6	18.70
Fifth	15	1	6.60
Sixth	5	1	20.00
Seventh	5	2	40.00

TABLE IX.

Myomectomy during pregnancy and results to co-existing pregnancy.

Author	No. of Cases	Deaths	2nd month Ab.	2nd month Nor. L.	3rd month Ab.	3rd month Nor. L.	4th month Ab.	4th month Nor. L.	5th month Ab.	5th month Nor. L.	6th month Ab.	6th month Nor. L.	7th month Ab.	7th month Nor. L.	Normal Pregnancies later
62	1	0	—	—	—	1	—	—	—	—	—	—	—	—	—
63	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—
64	1	0	—	—	1	—	—	—	—	—	—	—	—	—	—
65	5	0	1	—	1	2	—	—	—	1	—	—	—	—	—
66	5	1	—	—	—	—	1	1*	—	P.†	—	—	—	—	—
67	8	0	—	—	1	—	1	-	—	—	1‡	—	—	—	—
68	3	0	1	1§	—	—	—	—	—	—	—	—	—	—	—
69	1	0	—	—	—	—	—	1	—	—	—	—	—	—	—
70	1	0	—	1	—	—	—	—	—	—	—	—	—	—	—
71	1	0	—	—	—	1	—	—	—	—	—	—	—	—	—
72	1	0	—	—	—	—	—	1	—	—	—	—	—	—	—
73	1	0	—	—	—	F.‖	—	—	—	—	—	-	—	—	—
74	2	0	—	—	1	1	—	—	—	—	—	—	—	—	—
75	5	0	1	—	1	2	—	—	—	1	—	—	—	—	1
76	1	0	—	F.	—	—	—	—	—	—	—	—	—	—	—
77	1	0	—	—	—	—	—	—	—	P.	—	—	—	—	—
78	1	0	—	—	—	—	—	—	—	—	—	—	—	—	—
79	1	0	—	—	—	1	—	—	—	—	—	—	—	—	—
80	2	0	—	—	—	—	1	1	—	—	—	—	—	—	—
81	1	0	—	—	—	—	—	1	—	—	—	—	—	—	—
83	1	0	—	—	—	—	—	—	—	—	—	—	—	P.	—
84	3	0	—	—	—	1	—	1	—	1	—	—	—	—	—
28	15	1	—	—	—	3	1	2	1	1	—	—	—	—	3
85	2	0	—	—	—	—	—	—	—	1	—	1	—	—	—
86	2	0	—	2	—	—	—	—	—	—	—	—	—	—	—

TABLE IX (*continued*).
Myomectomy during pregnancy and results to co-existing pregnancy.

Author	No. of Cases	Deaths	2nd month Ab.	2nd month Nor. L.	3rd month Ab.	3rd month Nor. L.	4th month Ab.	4th month Nor. L.	5th month Ab.	5th month Nor. L.	6th month Ab.	6th month Nor. L.	7th month Ab.	7th month Nor. L.	Normal Pregnancies later
87	1	0	—	—	1	—	—	—	—	—	—	—	—	—	—
88	1	0	—	—	—	—	—	C.S.	—	—	—	—	—	—	—
89	1	0	—	—	—	—	—	—	—	1	—	—	—	—	—
90	1	0	—	—	—	—	—	1	—	—	—	—	—	—	—
91	1	0	—	—	—	1	—	—	—	—	—	—	—	—	—
92	1	0	—	—	—	—	—	—	—	1*	—	—	—	—	—
52	1	0	1	—	—	—	—	—	—	—	—	—	—	—	—
21	5	0	2	1	—	1	—	1	—	—	—	—	—	—	—
93	2	0	—	—	—	—	—	2	—	—	—	—	—	—	—
53	3	0	—	—	—	1	—	1¶	—	—	—	—	—	—	—
94	2	0	—	—	—	—	—	—	—	1 & 1F.	—	—	—	—	—
95	1	0	—	—	—	1	—	—	—	—	—	—	—	—	—
96	1	0	—	—	—	—	—	—	—	—	—	1	—	—	—
97	1	0	—	1	—	—	—	—	—	—	—	—	—	—	—
98	2	0	—	—	—	—	—	F.	—	—	—	—	—	1	—
99	2	0	—	—	—	P.	—	1	—	—	—	—	—	—	—
100	3	0	—	1	—	—	—	2	—	1	—	—	1	1	—
101	3	0	—	—	—	2	—	—	—	1	—	—	—	—	—
102	4	0	—	1	—	2	1	—	—	—	—	—	—	—	1
103	2	0	—	—	—	—	—	2	—	—	—	—	—	—	—
104	1	0	—	—	—	—	—	—	—	1	—	—	—	—	—
105	1	0	—	—	—	—	—	—	—	—	—	P.**	—	—	—
106	1	0	—	—	—	—	1	—	—	—	—	—	—	—	1
107	1	0	—	—	—	—	—	—	—	—	—	1	—	—	—
Liverpool	10	0	1	—	1	2	—	3††	—	—	—	—	—	—	—

TABLE IX (*continued*).
Myomectomy during pregnancy and results to co-existing pregnancy.

Author	No. of Cases	Deaths	Details.	Normal Pregnancies later
39	17	1	10 terminated at time of operation; 7 normal labours.	—
58	27	2	21 normal labours.	—
108	1	0	1 normal labour.	—
109	1	0	Continuing normally when patient left hospital. Labour not reported.	—
110	1	0	Pregnancy undisturbed.	—
40	1	0	1 normal labour.	1
111	2	1	2 abortions.	—
10	13	0	1 premature labour at 7½ months, 8 normal labours, 2 abnormal labours (contracted pelvis3. No trouble from myomectomy.	—
26	5	0	2 emptied at time of operation, 1 abortion, 2 normal labours.	—
112	12	1	1 abortion, 9 normal labours, 2 forceps.	—
113	1	0	Abortion 14 days later.	—
114	14	0	1 abortion, 13 normal labours.	—
115	1	0	1 normal labour.	—
P43	9	0	3 abortions and 6 deliveries.	—
116	2	0	1 abortion, 1 normal labour.	—
17	4	0	4 normal labours	—
51	3	0		—
47	23	?	2 abortions, 11 normal labours, 7 extra-uterine pregnancies.	1
117	13	0	1 abortion, 12 labour not stated.	—
14	4	0	1 abortion, 3 normal labours.	—
19	7	0	2 abortions, 4 normal labours, 1 Caesarean section.	—

TABLE IX (*continued*).
Myomectomy during pregnancy and results to co-existing pregnancy.

Author	No. of Cases	Deaths	Details.	Normal later Pregnancies
118	16	1	*1 (1 premature, 5 normal at term, 3 forceps, 5 pregnancies continued, labour unknown	2
119	1	0	1 normal labour.	—
120	2	0	†1 (1 not stated, normal labour).	—
121	10	1	1 premature labour, 4 normal labours (1 stillborn), 2 forceps, 2 labour unknown.	—
16	3	0	1 abortion, 2 normal labours.	—
122	2	0	2 normal labours.	—
123	1	0	Pregnancy continuing 3 months later.	—
124	4	1	‡2 normal and 1 at term but not in labour.	—
125	52	1	4 abortions, 4 premature labours, 41 normal labours.	—
126	2	1	1 normal labour.	—
P1	3	0	2 abortions.	—
P2	1	0	1 abortion (5 months).	—
P34	1	0	1 normal labour.	—
P33	14	0	2 abortions, 8 normal labours, 4 Caesarean sections (never does this now, waits for term).	—
P8	2	0	2 normal labours.	—
P7	1	0	1 abortion. Normal delivery 2 years later.	
P6	3	0	1 abortion, 2 normal labours. 1 patient had a normal labour 2 years later.	

* at 4th month of pregnancy; terminated in abortion.
† at 4th month of pregnancy; terminated in normal labour.
‡ 2 { 1 at 2nd month of pregnancy; terminated in normal labour.
{ 1 at 3rd month of pregnancy; terminated in normal labour.

TABLE IX (*continued*).

Myomectomy during pregnancy and results to co-existing pregnancy.

Author	No. of Cases	Deaths	Details.	Normal Pregnancies later
P32	3	0	1 abortion, 2 normal labours.	—
P9	3	0	2 normal labours, 1 Caesarean section.	—
P13	3	0	3 normal labours, one case with ectopic.	—
P17	4	0	2 normal labours, 2 pregnancies continuing at time of report.	—
P15	4	1	? result to pregnancies.	—
P16	7	0	3 abortions, 4 pregnancies continued.	—
P42	1	0	1 abortion.	—
P19	3	0	3 abortions.	—
P37			About 10 a year, abortion in 20 per cent.	—
P21	4	0	1 abortion.	—
P22	5	0	All pregnancies went to term.	—
P23	2	0	Pregnancy not affected.	—
P26	5	0		
P25	12	0	3 abortions, 9 went to full term.	—
P29	10	0	No abortions.	—
P14	3	0	No abortions.	—
P40	3		1 abortion, 2 normal labours.	—

P. Premature labour. F. Forceps delivery. C.S. Caesarean section. Ab. Abortion. Nor. L. Normal labour.

* Subsequent course of pregnancy and labour unknown. † And one other abortion. ‡ One abortion and 5 normal labours. § And one of unknown age which carried to term. || Child died. ¶ And one abortion, stage of pregnancy not stated. ** Died two days later. †† And one abortion, time of pregnancy unknown.

The precautions against the occurrence of abortion in the literature are always very gentle handling of the uterus and appendages during operation and the liberal use of morphia during the first two or three days after operation.

Myomectomy in Labour.

The number of operations recorded in labour is even smaller than that during pregnancy. As it is only undertaken for obstructed labour it is always combined with Caesarian section. There are 39 cases with six deaths (15.4 per cent). In each case in which the state of the child is mentioned, it was alive in 20 cases and died shortly after delivery in one case.

TABLE X.

Myomectomy and Caesarean section in labour.

Author	Cases	Deaths	Children	
			Alive	Dead
128	1	0	1	—
58	4	1	—	—
129	1	0	1	—
71	2	0	—	—
130	2	0	—	—
131	1	1	1	—
112	6	1	—	—
116	2	0	—	—
17	1	1	—	—
28	2	1	2	—
86	1	0	—	—
132	1	0	1	—
121	10	1	9	—
133	1	0	1	—
Liverpool	2	0	2	—
P6	2*	0	2	—

* Each patient had two normal labours later.

In one of the Liverpool cases a second Caesarean section was undertaken five years later, and two more fibroids were removed. Two years after the second Caesarean section the patient reported herself as perfectly well and not any fibroids could be felt.

Troell[127] collected cases of fibroids treated in labour between 1900 and 1909 and found:

	Cases	Mortality (per cent)
Caesarean section with myomectomy	20	11.1
Caesarean section with sub-total hysterectomy ...	43	7.1
Caesarean section with total hysterectomy ...	20	10.5

Lockyer[17] commenting on Troell's[127] figures, says that in labour myomectomy should be confined to pedunculated growths. The safest procedure when interference in labour is necessary is Caesarean hysterectomy or, if the foetus is dead, removal of the uterus unopened.

Myomectomy in the Puerperium.

Abdominal myomectomy is very rarely called for in the puerperium as is seen in Table XI.

TABLE XI.

Myomectomy in the puerperium.

Author	Cases	Deaths	Time
116	1	0	———
17	1	1	———
134	1	0	54 days after delivery.
124	1	0	3 weeks after a 6 weeks' abortion. Became pregnant later and had 2 children.
Liverpool	1	0	24 hours after delivery.

The Liverpool case who was 40 years of age at the time of the operation, was seen two years later and reported herself to be well, menses were normal, no further pregnancy had occurred, and on vaginal examination a recurrence could not be detected.

When fibroids give rise to symptoms in this state it is usually due to the attempted extrusion of a growth which has become submucous during the process of involution with consequent haemorrhage. These growths can, as a rule, be readily removed by the vaginal route. Brindeau[58] records 42 such cases with one death.

SUMMARY.

1. Myomectomy by the abdominal route only is discussed.

2. The indications and contra-indications of the operation with points in its technique are described.

3. The mortality of the operation is between 1.35 per cent and 5 per cent. It is suggested that the mortality should be compared with that for hysterectomy in patients under 40 years of age and not in all patients. In the small figures of the Liverpool group it is shown that the mortality of myomectomy is 1.4 per cent greater than that of hysterectomy for patients under 40.

4. As a result of the operation menstruation returns to normal in over 80 per cent of patients.

5. Of the patients who are likely to conceive after the operation 27 per cent become pregnant, and not more than 2 per cent of these have abnormal labours.

6. The morbidity rate differs little from that of hysterectomy.

7. Rupture of the scar in subsequent pregnancy is a very rare accident.

8. Recurrences after operation occur in about 4 per cent to 8 per cent.

9. Myomectomy in pregnancy has a somewhat higher mortality than in the non-pregnant state, but 80 per cent of the patients have living children.

10. Myomectomy in labour is rarely advisable and hysterectomy is safer.

11. Abdominal myomectomy is rarely necessary in the puerperium.

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PERSONAL COMMUNICATIONS.

P1. Adair and Davis. University of Chicago.
P2. Atlee, H. B. Victoria General Hospital, Halifax, Canada.
P3. Binet, A. University of Nancy
P4. Conill, Victor. University of Barcelona.
P5. Daels, F. University of Ghent, Belgium.
P6. De Snoo. University of Utrecht.
P7. Dawson, J. B. Dunedin, New Zealand.
P8. Dannreuther, W. T. Post-graduate Medical School and Hospital, New York.
P9. Emge, L. A. Stanford University, San Francisco, California.
P10. Havlasek, L. Brno, Czechoslavakia.
P11. Heynemann. University of Hamburg.

P12. Koenig, R. Geneva.
P13. Kovacs, F. University of Debrecen, Hungary.
P14. MacKay, D. S. The General Hospital, Winnipeg.
P15. Mahfouz, N. University of Cairo.
P16. Martius. University of Göttingen, Germany.
P17. Maguire, F. A. Royal Prince Alfred Hospital, Sydney.
P18. Miller, N. F. University of Michigan, Ann Arbor, Michigan.
P19. Müller, G. Masaryk's University, Brno, Czechoslavakia.
P20. Mylks, G. W. Kingston General Hospital, Ontario, Canada.
P21. Pamboukis, D. Municipal Hospital, Athens.
P22. Phaneuf, L. E. Tufts College Medical School, Carney Hospital Clinic.
P23. Plass, E. D. State University of Iowa.
P24. Plumtree and Mudaliar. Hospital for Women and Children, Madras.
P25. Stander, H. J. Woman's Clinic, New York Hospital.
P26. Scott, W. A. University of Toronto.
P27. Taylor, Howard C. Roosevelt Hospital, New York.
P28. Tew, W. P. Victoria Hospital, Western Ontario, Canada.
P29. Ward, G. Gray. Woman's Hospital New York.
P30. Villard, E. Gynaecological Clinic, Lyon.
P31. English, J. S. College of Medicine, Singapore.
P32. Ellul, J. Malta.
P33. Cooke, W. R. University of Texas.
P34. Barjaklarovitch, G. S. University of Belgrade.
P35. Whitehouse, Beckwith. University of Birmingham.
P36. Curtis, A. H. Northwestern University, Chicago-Evaston, Illinois.
P37. Orfila, J. Pou. University of Montevideo, Uruguay.
P38. Miller, N. F., and Sehring, G. H. University of Michigan, Ann Arbor, Michigan.
P39. McCann, F. J. London.
P40. Burger, C. Royal Hungarian School of Midwifery.
P41. Litzenberg, J. C. University of Minnesota, Minneapolis, U.S.A.
P42. Essen-Moller, E. University of Lund, Sweden.
P43. Knaus, H. Prague.

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[*The discussion on this subject at the Congress of Obstetricians and Gynaecologists at Belfast is on page* 769.]

Uterine Carcinoma following Radiotherapy for Benign Lesions.

BY

GILBERT I. STRACHAN, M.D., F.R.C.P. (Lond.), F.R.C.S. (Eng. and Edin.), F.C.O.G.

Professor of Obstetrics and Gynaecology in the Welsh National School of Medicine; Obstetrician and Gynaecologist to Cardiff Royal Infirmary.

THE use of radium for curative purposes in uterine carcinoma is now so widely practised that it does not require any discussion. But, on account of the very nature of the disease, ultimate freedom from symptoms is obtained in only a relatively small proportion of cases, and the others either fail to react satisfactorily or do so for only a limited time.

In the treatment of the so-called chronic metritis or fibrosis uteri, however, the results of radium treatment are excellent, and with the exhibition of 2,400 to 3,000 mgm. element hours, it can be anticipated that haemorrhage will be controlled and that permanent amenorrhoea will be secured in fully 95 per cent of cases, so that surgery is relatively seldom employed at present for this type of case.

These represent the two main gynaecological uses of radium to-day, and while the one condition treated is frankly malignant the other is essentially benign. A causal relation between the endometrial hyperplasia in the one case and the malignant proliferation in the other has been postulated by Howard Taylor[1] and others, but has never been definitely established, and objective evidence of such a transformation has not, so far, been demonstrated. In the early days of radiotherapy much investigation was carried out in order to determine the best technique of application, and this has now largely come to be standarized, but the opinion gained currency at that time, and is still held by some, that a dose of radium insufficient to disintegrate the carcinoma cell might stimulate it to more rapid growth, and clinical support has been given to this view by the case very

occasionally encountered in which radiotherapy is followed by rapid growth and dissemination of the primary tumour.

Such a cause and effect is, however, difficult to prove, as so many unknown factors may combine to produce this sudden and rapid growth, and it is known, in the case of uterine sarcoma, that such a tumour may be present for years and then, without evident cause, begin to grow with great rapidity.

But the consideration of the two cases about to be described raises the further problem as to whether carcinoma formation can be stimulated in endometrial epithelium, so far benign, by the application of radium to a lesion demonstrated to be benign.

The particulars of the cases are these:

CASE 1. Miss H. S., aged 21 years, was admitted to Cardiff Royal Infirmary under my care on November 24th, 1925, with the history of irregular and profuse menstruation of two months' duration, with the passage of clots. This confined her to bed and produced great general weakness. There were no other symptoms. She was pale and anaemic, but not wasted, and on local examination the pelvic organs were found to be normal but for some slight bulkiness of the uterus, with enlargement of the right appendages. On November 26th, 1925, curettage was performed with removal of oedematous and thickened endometrium, which, on microscopic examination, showed oedema of the stroma and glandular hyperplasia.

She was readmitted on February 19th, 1926, with persistence of the symptoms and similar physical signs. The uterus was again curetted, and endometrium as before was removed; on discharge she had definitely improved, while the haemorrhage had ceased.

She was again readmitted on May 1st, 1928, with recurrence of the uterine bleeding after temporary cessation, and she was now losing weight, and had nausea and constipation. Local examination now showed a normal physical condition of the pelvic organs, but in view of the persistence of the bleeding, because of her deteriorating general condition, and in spite of her age, it was decided to produce an artificial menopause; on May 14th, 1928, the uterus was again curetted and she received a 2,400 mgm. element hours dose of radium into the interior of the uterus. The appearance of the curettings was as before (Fig. 1). Amenorrhoea occurred and persisted for three years, and then menstruation returned, lasting six to seven days and recurring every two months. She was married in 1929, but pregnancy has not occurred.

She was again admitted under my care on May 16th, 1935, this time to Llandough Hospital, Cardiff, with a history of some continuous brown, watery, vaginal discharge of uncertain duration. Her general condition was good, and she showed only slight anaemia, while the cervix and uterus were found to be small, atrophic, and freely mobile with the fornices clear. Exploratory curettage by Dr. Garfield showed profuse pale, lumpy material, and microscopically adenocarcinoma was shown. Subsequent laparotomy showed the pelvic organs all outwardly normal without any sign of

infiltration; total hysterectomy and double salpingo-oöphorectomy were performed without incident.

Examination of the specimen after removal demonstrated a proliferating carcinoma with only a slight degree of penetration, and confined to the fundus; the lower part of the uterus was free of growth, and, but for a follicular cyst in the right ovary, the appendages were normal. Microscopically the growth was a papilliferous adenocarcinoma which did not show any great penetration into the uterine musculature (Fig. 2). The patient made an uneventful recovery and is, so far, free of any recurrence.

CASE 2. Mrs. C., aged 45 years, was admitted to Cardiff Royal Infirmary in July 1933. She had not had any children after 22 years of marriage, but had had one abortion 20 years ago.

Menstruation was always profuse, lasting eight days; but it had been increasingly frequent for the last two years and she had had continual profuse loss for the previous month. But for some anaemia the general condition was good, and local examination showed a slight cervical erosion with the anteverted uterus generally bulky and hard. The fornices were clear. After curetting the uterus a 2,400 mgm. element hours application of radium was made to the interior of the uterus. The curetted material was rather congested and hypertrophic, while the microscope demonstrated some irregular glandular distension with oedema and vascularity of the stroma. (Fig. 3.)

Amenorrhoea ensued and she was free of symptoms until March 1935, when she had slight vaginal bleeding which recurred in April. From early July she noticed pelvic discomfort and abdominal distension with asthenia, although loss of weight was denied. She was thin, with a generally distended abdomen, while the uterus appeared to be enlarged, hard, and fixed by infiltration.

On August 16th exploratory curettage did not show any uterine enlargement and only a very small amount of material was removed. At laparotomy general peritoneal carcinomatosis was demonstrated; a large amount of free fluid was then removed. The pelvis, omentum, and intestinal surfaces were involved, while some nodules on the surface of the liver were present, and it was the matting due to this condition that had given the previous impression of uterine enlargement. The uterus was not enlarged, but it appeared to be the central focus of the pelvic mass. As a curative operation was not possible, a piece of the affected omentum was removed for section and the abdomen closed.

Microscopically the omentum was infiltrated with glandular carcinoma (Fig. 4), as was expected, but the scanty curettings also showed a papilliferous adenocarcinoma (Fig. 5), and it may safely be presumed that the intra-abdominal extensions were secondary to the uterine condition.

A search through the available literature shows few similar cases. Fournier[2] records such a case in which carcinoma of the body occurred 10 years after the insertion of radium for menorrhagia, and he states that 65 other cases have been reported,

but does not give any references to these; while Linton, Marks, and Van Smith,[3] discussing the radium treatment of non-malignant haemorrhage, mention that not one of the patients in their series had malignant disease at the time of treatment and that only two are known to have developed carcinoma later.

In discussing these cases various considerations arise, the most important of which is the possible influence of radium as a factor predisposing in any way to the later occurrence of carcinoma. Now, in both of these cases the carcinoma developed in the body of the uterus after an artificially produced menopause, and while the factors that produce carcinoma at any place and at any time are not known with exactness, it has been pointed out[4] that in the uterus, after the menopause, epithelial atrophy occurs to a much greater extent in a given time in the body than in the cervix; in the latter situation the squamous and glandular epithelium may maintain their adult appearance until well over 70 years of age by which time it has entirely disappeared from the corporeal endometrium. This would indicate a lesser tendency to development of carcinoma in the body than in the cervix after the menopause, and clinical experience supports this supposition.

The question is again raised whether the amenorrhoea produced by the radium is caused by the paralysing action of that element on ovarian tissue, or whether its action is directly on the endometrium, and, if the latter, whether such an effect is in any way likely to produce changes predisposing to carcinoma.

In a case of non-malignant haemorrhage which fails to react satisfactorily to radium the appearance of the endometrium is usually patchy. In some areas hyperplastic active endometrium is present, while in others the main picture is of atrophy indicating an irregular action of the radium, and this, together with the fact that fully half an inch of uterine muscle is interposed between the radium and the ovaries which lie about one inch away from the radium, makes it, in our opinion, likely that the main effect of the radium in these cases is in the nature of local direct destruction of endometrium, and that it is in this way that the subsequent amenorrhoea is produced.

The presence of an unruptured follicle in the ovary of the first case raises the question whether the oestrin so secreted might not have had a stimulating hypertrophic effect on the atrophied endometrium and so produced a predisposition to the development of carcinoma. It cannot be known to what extent this condition may persist after the normal menopause, but it

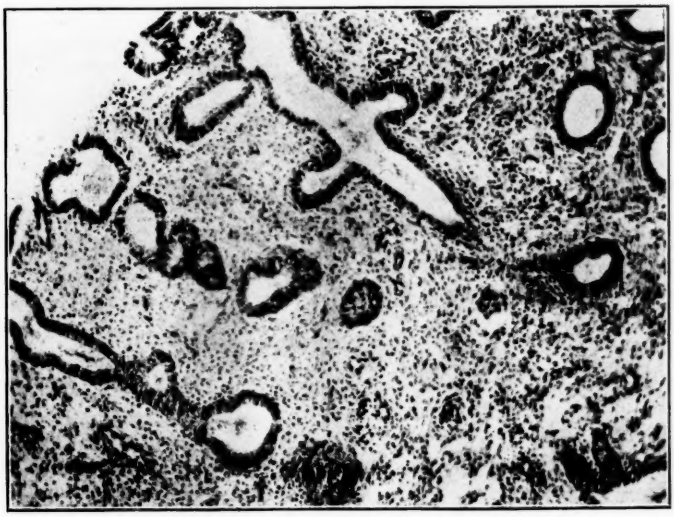

FIG. 1.

Case 1. Microphotograph of curettings, May 14th, 1928, showing hyperplastic mucosa but no sign of carcinoma. (×85)

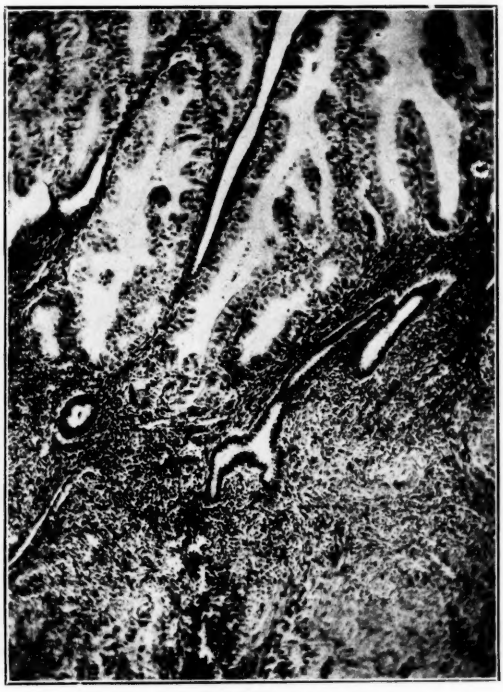

FIG. 2.

Case 1. Microphotograph of adenocarcinoma of uterus removed in May 1935. The condition is seen to be hyperplastic and proliferating but with no great tendency to penetrate into the depths of the uterine musculature; several unaffected endometrial glands are to be seen in the superficial layers of the muscle. (×85)

FIG. 3.

Case 2. Microphotograph of curettings, July 1933, showing a condition similar to Fig. 1. There is no suggestion of carcinoma. (×85)

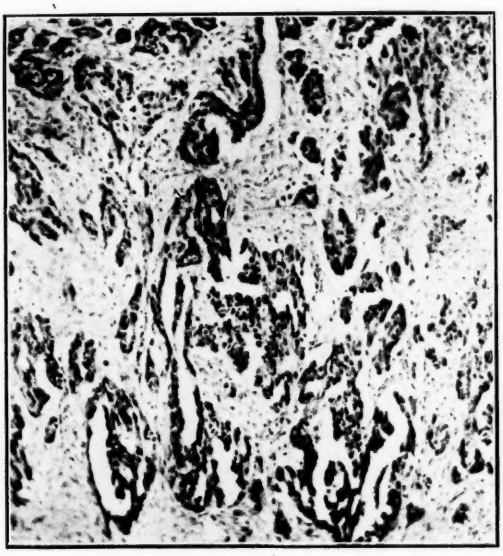

FIG. 4.

Section of omentum removed in August 1935. Infiltration with carcinoma cells is seen with persistence of adenocarcinomatous structure along with anaplasia. (×85)

FIG. 5.

Case 2. Microphotograph of curetted material, August 1935, showing papilliferous carcinoma. (×85)

would appear to be at least a possible cause of those cases of post-menopausal bleeding in which the curettings do not show any sign of carcinoma. The ovarian condition in the second case could not be investigated on account of surrounding malignant matting.

With the exception of sterility, which in Case 1 could be attributed to the action of the radium, there are few points common to the two cases; the one was 24 and the other was 45 years of age when radium was inserted; the development of carcinoma occurred in one case seven years, and in the other under two years after radiotherapy; while, in one case carcinoma was definitely present in the uterus and localized there, but in the other it appeared to have extended rapidly to the abdomen before it had time to assume any large size in the uterus.

It is not possible to draw any important conclusions from the data supplied by the consideration of only two cases, but it does not appear that in the cases reported any points have emerged which would justify us in concluding that the occurrence of the carcinoma was in any way due to the previous radiation of the uterus. The matter is an important one since, if it could be shown that the use of radium in cases of non-malignant uterine haemorrhage predisposed, even to the slightest extent, to the later production of carcinoma, the present extensive and satisfactory use of this element in the treatment of these conditions would be checked and we should, once again, need to have recourse to operative removal of the uterus in such cases, which would be a retrograde step.

It is the common experience that carcinoma of the body commonly occurs after the menopause, and Fahmy,[5] in 1933, found this condition present in almost 10 per cent of 937 cases of post-menopausal haemorrhage investigated by him, while Howard Kelly[6] found that over 35 per cent of such cases occurred in the post-menopausal period. It would seem justifiable, therefore, to assume that the factors which operated in the production of carcinoma in these two cases after the artificial menopause are similar to those which obtain after the normal menopause; but we are also forced to the conclusion, from a consideration of the cases reported, that the successful treatment of non-malignant uterine haemorrhage with radium does not shield the patient, as does hysterectomy, from the possible later development of intra-uterine carcinoma, although the risk of this can be regarded as extremely slight. This consideration would not be any justifi-

cation, in my opinion, for the abandonment of radiotherapy in favour of hysterectomy in such cases, as the operative mortality would more than counterbalance the very slight possibility of subsequent carcinoma. Fournier[1] believes that in the majority of cases of this nature carcinoma was present at the time of initial radiation but was overlooked, and he rightly stresses the importance of curettage with microscopical examination of the curettings in all cases of non-malignant bleeding treated by radium. This is our invariable practice, and it has resulted in the occasional identification of an unsuspected case of carcinoma of the body of the uterus; in the cases under consideration such exploratory curettage did not show any trace of malignancy at the time of radiation.

I am grateful to Dr. Grace Jones for her careful and tedious search of the literature for similar cases.

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Primary Malignant Diseases of the Vulva, with special reference to treatment by Operation.

BY

THE LATE W. BLAIR-BELL, LL.D. (Glas. & Liver.), M.D. (Lond.), F.R.C.S. (Eng.), F.A.C.S., F.C.O.G.

AND

MORRIS M. DATNOW, M.D. (Liver.), F.R.C.S. (Edin.) M.C.O.G.

Hon. Assist. Gynaecologist, Royal Southern Hospital, Liverpool; Hon. Assist. Surgeon, Liverpool Maternity and Women's Hospital.

IF we may judge from the literature, malignant diseases of the vulva and their treatment have attracted much more attention in America and on the Continent than in Great Britain. Nevertheless it is a subject of much importance, and for this reason we present a brief survey of it, together with an account of our own somewhat limited experience of the radical operative treatment.

PATHOLOGICAL VARIETIES.

Malignant disease of the vulva occurs as squamous-cell carcinoma in over 90 per cent of all cases. Other types are comparatively or actually rare. Adenocarcinoma arising in Bartholin's gland (Veit[1] and Spencer[2]) is encountered in about 5 per cent of all cases of carcinoma (Rothschild[3]). We have seen only one case and this was inoperable. It is possible, too, for this variety to develop in sweat glands and sweat-gland adenomata (Pick[4] and Ruge[5]). Basal-cell cancer has also been described (Leigher[6]). Melanomata (Holland[7]) are uncommon; but teratomata (Duclaux and Herrenschmidt[8]) and sarcomata (Blair-Bell[9]) of various kinds, including endothelioma, are very rarely observed.

In a general way our remarks will, therefore, concern squamous-cell cancer.

INCIDENCE.

A few assessments of the relative frequency of vulval carcinoma in relation to cancer of the female genitalia have been made.

These comparisons are almost entirely with uterine and ovarian malignant neoplasms, for primary malignant diseases of the Fallopian tubes and vagina are rarer than those of the vulva. Clark and Norris[10] reported 30 cases of carcinoma of the vulva among 1,119 gynaecological specimens of a malignant nature—a comparative incidence of 2.3 per cent. Schottlander and Kermauner[11] state that the frequency is between 2 and 4 per cent. Dittrick,[12] however, places the percentage at a higher figure, namely 5.6. The differences reported in regard to relative incidence are probably due to the limited number of cases on which estimations have been based; but these are sufficient to show that the disease is not uncommon and must be observed from time to time by all who practise gynaecology.

Age of the Patient.

While cancer of the vulva has been seen at all ages from 10 to 90 years—Lovgren[13] states that he has seen an inoperable squamous-cell cancer of the vulva involving the vagina in a child 17 months old—it is, as with cancer of the body of the uterus, for the most part a disease of the postmenopausal time of life. The years between 50 and 70 appear to be the commonest age-period.

Dittrick collected 135 cases. The youngest patient was 20 years of age and the oldest 90 years. The average age was unusually high, namely 70 years, and 84 per cent were over 45 years old.

Schreiner and Wehr[14] discuss 118 cases, of which nine (7.6 per cent) were under 40 years, 30 (25.4 per cent) between 40 and 50 years, and 79 (67 per cent) over 50 years of age.

Civil State of Patient.

Although a majority of patients have been married and are parous, the disease has so often been found in nulliparous women and in virgins that parity does not appear to have any relation to the disease. It is, however, probable that cancer of the vulva occurs in the lower classes with greater frequency than in the upper, and this may be due to the cleanlier habits of the latter.

Site of the Disease.

Carcinoma may arise in any part of the external genitalia. According to Taussig,[15] Rothschild found that in 395* cases, which he collected, the lesions were distributed as follows:—

* This figure should apparently be 337. We have been unable to see Rothschild's Inaugural Dissertation.

Labia majora	105
Clitoris	62
Clitoris and labium on one side	41
Clitoris and both labia	21
Labia minora	35
Labia majora and minora	29
Posterior commissure	21
Periurethral	6
Bartholin's gland	17

Ederle[16] found that in a collection of 677 cases of vulval cancer the disease started in the clitoris in 109.

It seems that the clitoris and labia are the sites most often primarily affected; but in many cases the disease when first seen has spread so widely to adjacent parts as to make it difficult, if not impossible, for the observer to discover where it originated.

When the lesion has commenced in, or in the neighbourhood of, the urethral orifice and has extended, operation is more difficult than when the site of origin is elsewhere.

Diagnosis.

There is a general consensus of opinion that leukoplakia vulvae is a predisposing condition, and that, when cracks occur in the surface, epithelioma frequently develops at these spots; indeed, in such circumstances multiple neoplastic developments may be found. The lesion may be papillary (cauliflower-like) in appearance, ulcerative, or—especially with carcinoma of Bartholin's gland—deeply invasive with relatively little superficial evidence of the disease.

In the earlier stages, pruritus or a burning sensation in the vulva is experienced by the patient. Later, she complains of a lump or of swelling of the parts. In the extensive ulcerative phases, a blood-stained offensive discharge occurs, and there may be considerable pain. Should the urethral orifice be involved urinary discomfort and difficulty may supervene, and later incontinence. Constitutional symptoms are usually absent until the later stages, and distant metastases are rare.

A differential diagnosis from tuberculosis and syphilis may be necessary in lesions with superficial ulcerations. Tertiary syphilitic manifestations, too, with nodular hyperplasia and ulceration may cause difficulty in diagnosis. We have illustrated a case of this kind (Blair-Bell[17] and others). Histological examination is a certain method of diagnosis.

Progress and Prognosis.

The cancerous process may soon cover a large area of the vulva, and contact lesions are sometimes seen. The ulcerative and invasive types rapidly involve the lymph glands in the inguinal and femoral regions, and ultimately the connected pelvic glands on the iliac vessels. Dittrick[12] states that the inguinal glands are affected in the second six months of the existence of the disease in 50 per cent of all cases. As already mentioned, distant metastases are unusual, but have been found in the lungs, liver, heart, spleen and kidney (Kustner [17a]), and we have seen a case in which there with general dissemination in the skin of the trunk and limbs. When the pelvic lymphatics are invaded the disease is in the latest stages. It is said that in untreated cases death usually supervenes within two years of the discovery of the growth (Ewing[18]). Sepsis, which is always present in ulcerative lesions, no doubt contributes to the final issue. As the deeper structures become implicated pain may be very severe and difficult to relieve.

Carcinoma of the vulva has been regarded by most clinicians as a very intractable and fatal type of malignant disease; and even since the adoption of more radical surgery investigations appear to show that this is still a formidable lesion. Rentschler[19] for example, reported 71 cases treated in the Mayo Clinic by surgery, irradiation, and by a combination of the two methods. Of these only 13 (18.3 per cent) were alive and free from the disease at intervals between 1 and 15 years. Tausch,[20] also, has recorded 39 cases, of which only 7 per cent were absolutely cured although 15 per cent lived for five years. Schulz[21] too, has described 23 cases, and of these 13 per cent were alive five years after the operation. According to these figures it would appear that clinical cures of five years duration must not be expected in more than 15 per cent of all cases submitted to operation, and that absolute cures are obtained only in about 7 per cent. On the other hand, Rupprecht[22], Stoeckel[23], and others take a more favourable view of the prognosis.

It must, however, be admitted that, in formulating the prognosis in the limited number of personal cases available for analysis, investigators do not appear always to have taken sufficient account of certain essential considerations. By this we mean that the surgeon who is so fortunate as to meet with a considerable percentage of early cases, or cases of a low grade of malignancy, will naturally form a better opinion of the results of treatment than a colleague who has seen cases of a more serious type. It may be said that patients in whom an involvement of the

inguinal glands is not obvious will show excellent final results after radical surgical procedures. Moreover, lesions of a low grade of malignancy are likewise favourable. It is, however, unusual to see patients suffering from the disease in a very early stage. This is partly due to the age and class of woman most prone to the condition, and partly to the fact that during the initial stages the symptoms are not serious from the patient's point of view. This view is especially liable to be held when the patient has previously suffered for many years with irritation due to leukoplakia. In these circumstances it is all the more necessary that the neoplasia be graded before a prognosis is attempted.

Treatment.

Many women come under observation when the disease is too far advanced to permit other than palliative measures being adopted. We have seen a number of such cases, and although considerable progress has been made in the local use of radium and diathermy for the purpose of alleviation, we propose to discuss here curative treatment only.

In regard to the use of X-rays and radium we ourselves have had but little experience, having employed radium alone in a few inoperable cases only. The experiences of others, however, has not been encouraging. Dittrick[12] states that X-rays may relieve pain but otherwise are of little value.

Jung[24] reports the treatment by X-rays in the Erlangen Frauenklinik of 13 cases with disappointing results, but these are not reported in detail.

Clark and Norris[10] consider that radium should precede and X-ray treatment follow radical operation. These authors point out, however, that squamous-cell carcinoma is the most radio-resistant type and is little influenced.

Wolf[25] treated 40 cases, mostly with X-rays and radium, but some in combination with operation. Only one was alive five years later.

Stoeckel[26] states that 11.9 per cent of patients treated with radium by a number of different observers show freedom from metastases for a period of five years, but that in his own cases submitted to operation 35.6 per cent remained well for the same period. Here, however, there is not any indication as to whether the lesions submitted to radium were all inoperable; if so, the difference in the extent of the disease might well be held to account for the difference in the results obtained by the two methods.

Petit-Dutaillis[27] also, prefers radical operation to radium which he considers ineffective.

It appears then, from these and many other reports, that radium and X-rays are not of any great value in the curative treatment of this disease.

Radical operative procedures, on the other hand, are steadily increasing in favour. The earlier incomplete operations, by which often the involved clitoris or labium majus of one side alone was removed, could hardly be expected to secure good results in view of the rapid extension to the lymphatic glands which is known to take place. It has been pointed out by Kehrer[28] that the superficial lymphatic glands on the two sides are in anastomotic relation, and that a malignant lesion of one side of the vulva may infect glands in the opposite inguinal region. This means that the area over the *mons veneris* is the site of a network of lymphatic vessels, and accounts for the fact that local recurrence when present, is frequently found in this region.

The superficial lymphatic glands on either side are also connected with the deep inguinal, the obturator, and the pelvic (iliac glands) of the same side; and some surgeons—Kehrer[28] and also Stoeckel[26]—suggest that operative procedures should be extended to include all these more distant lymphatic glands. But, as Taussig[15] justly states, such an extensive operation on elderly patients can hardly be conducted in one stage without high mortality, and moreover, that such measures are not really justifiable, for if the iliac glands are involved the disease has probably extended further.

By radical operation we generally imply that procedure which aims at the removal of the superficial inguinal and femoral glands on both sides in one piece with the vulva. The external genitals together with the skin and underlying tissues over the *mons veneris*, are removed as widely as possible in accordance with the extent and position of the growth, which may even involve the perineum, and of the leukoplakic area, if there be one. When the orifice is involved the distal portion of the urethra should be excised. Here a little point of operative detail may be mentioned. If much of the urethra is removed the patient is liable subsequently to suffer with incontinence of urine. Such a misfortune, can, however, be prevented by rotating the exposed remnant of the urethra through half a circle before fixing it to the surface, and by suturing the muscular structures lying between the urethra and vagina firmly together from side to side, in order

to support and compress the urinary canal: this may necessitate a short longitudinal incision into the vagina.

With regard to the deeper inguinal glands, it seems unnecessary to open the canals to excise these with the round ligaments unless there is definite involvement of the superficial glands, for the femoral glands, including the gland lying in the femoral ring, can be removed without division of Poupart's ligaments. In all cases in which the superficial inguinal glands are found to be enlarged although this may be the result of infection only), it is probably wise to perform the operation of Basset[29] which includes the further procedures just mentioned, and has been well described and illustrated by Taussig.[15]

Lastly, it is probably better to use the diathermy knife for the vulval excision, owing to the impossibility of rendering the parts sterile, although the ulcerated surface or surfaces should have been well cauterized in advance.

Our experience is the same as that of all other operators in regard to the troublesome infection which is liable to follow operation, however carefully this may be performed. It is advisable, therefore, to employ drainage on either side of the femoral regions, and to carry the drainage material—a rubber tube or wick—into the inguinal wound.

After operation the external genital area should be kept dry by the use of an antiseptic dusting-powder. We have found that the tension on the stitches may be relieved to some extent by keeping the patient in the sitting position with the legs well flexed. This, however, does not reduce the strain on the tissues most affected, namely the flaps in the region of the pubes. Yet even with the greatest care and skilled nursing, infection is difficult to avoid. The result of this usually leads to nothing more serious than prolongation of convalescence and an unsightly scar in the lower abdomen; but one of our patients died as the result of septic toxaemia. We ourselves would welcome any suggestion to minimize this untoward complication. Perhaps the removal of the cancerous ulcer with the diathermy knife a few days before the major operation might be an advantage.

The radical procedures mentioned are based on the modern technique for dealing with cancer of the breast—that is to say, the inguinal and femoral regions are cleared first and the vulva removed afterwards, all in one piece.

Before we leave the general question of operation for vulval cancer we should like to express our support of the view of Berkeley and Bonney[50] that the incidence of carcinoma vulvae

could be reduced by one-half if all cases of leukoplakia could be effectively treated. With this object in view we have ourselves removed vulvae for advanced—that is, old standing—leukoplakia alone.

Personal Cases submitted to Operation.

We have, as already stated, seen a number of inoperable cases of malignant disease of the vulva, but these are omitted from consideration. In a few of the cases submitted to operation, the hospital records have been lost, the names, disease, and nature of the operation alone being known. The ultimate fate of these cannot be ascertained, although it is known that they made good recoveries.

Number of cases, 22; average age (19 patients), 53.8 years; (oldest patient, 70 years; youngest patient, 23 years).

Nature of disease. Squamous-cell carcinoma, 21 (primary lesion, 10; recurrent lesion, 2); spindle-cell sarcoma, 1.

Site of lesion. Labium majus, 10 (including labium minus and posterior vaginal wall, 2); labium minus, 5 (sarcoma, 1); clitoris, 5; vestibule and urethra, 2.

Treatment and results. Radical operation alone, 15 (one died of sepsis; three died of disease; three not traced). Radical operation followed by injections of lead, 5 (one died of disease). Radium (no result) followed by radical operation and injections of lead, 1 (died of disease). Radical operation followed by radium, 1 (died of disease).

Results of operation, with or without injections of lead. Number of cases, 22. Died of septic toxaemia 16 days after operation, one; died of femoral haemorrhage two months after operation, one; known to be dead of the disease, four; known to be alive and well for periods between five to 20 years after operation, 10; known to be alive and well for periods between one to five years after operation, three; recovered well but not now traceable, three.

Summary.

1. A brief discussion of malignant disease of the vulva with a consideration of some of the literature of the subject, is given. Twenty-two personal cases submitted to operation are recorded.

2. Cancer of the vulva is not uncommon, but owing to a variety of circumstances is often seen in the advanced stages when curative treatment is impossible.

3. In suitable cases radical operation should be practised in

preference to radiological methods. The results of timely operation are good.

4. The administration of lead by injection subsequently to operation appears to be beneficial.

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Discussions on the foregoing Subjects at the Congress of Obstetricians and Gynaecologists in Belfast, 1936

DISCUSSION OF THE OPENING PAPERS ON "CONSERVATIVE TREATMENT, OPERATIVE OR OTHERWISE, OF PATHOLOGICAL CONDITIONS OF THE OVARIES, FALLOPIAN TUBES, AND UTERUS, WITH SPECIAL REFERENCE TO FUNCTIONAL RESULTS."

Dr. O'Donel Browne, Dublin, congratulated the openers of the discussion on the excellence of their papers and on the way in which they had presented their material. He knew that such communications entailed prolonged and great investigation. He was particularly interested in the treatment of sterility, and the work which he had done on the subject, from the experimental point of view, had been commented upon by Dr. Solomons.

This experimental work had been prompted by the fact that Dr. Browne was very dissatisfied with the results obtained in the cure of human sterility. He had ample opportunity to form a sound opinion as to the value of the various operations to produce a patent Fallopian tube, as apart from his own experience, he had been assistant to Dr. Solomons for three years during his term of office as Master of the Rotunda Hospital. Working in conjunction with the late Professor Harold Pringle in the Physiological Department of Trinity College, Dublin, Dr. O'Donel Browne had carried out experiments on rabbits, which previously had been successful in producing young. The approved salpingostomy operations were performed and the rabbit allowed the opportunity of becoming pregnant. Owing to the structure of the rabbit's reproductive organ, the uterus being bicornute, the pregnant horn was readily recognized at post-mortem examination. Hydrosalpinx, catarrhal salpingitis, sterility of the threaded side were the general rule. No pregnancy was ever found in a tube which had been threaded. Apart from these negative results where pregnancy was concerned, Dr. Browne also reported that previously fertile rabbits were rendered sterile by the threading even of one cornu. He went on to state that the Fallopian tubes were threaded with chromic catgut, silk-worm gut and silk. The least reaction was found when silk-worm gut had been employed.

He called particular attention to the fact that conclusions must not be too readily drawn from experiments on the rabbit but that such would undoubtedly be of assistance, and he hoped at a later date to furnish a full report. He quoted a case on whch he had performed unilateral end-to-end anastomosis in the lumen, the other Fallopian tube being considered too hopeless for any restorative operation. Later the patient became pregnant, and, at Caesarean section, necessitated by a generally contracted pelvis, it was found that the apparently hopeless tube had recovered and was responsible for the pregnancy, whereas the tube which had been subjected to

operation was completely occluded. Dr. Browne thought this fact was an excellent recommendation for conservative pelvic surgery.

Finally, attention was drawn to the fact that all plastic tubal work was carried out in tissues which were previously damaged and possibly still mildly inflamed. Success in these circumstances was most unlikely and operation should never be advised unless the patient was warned that pregnancy would be most unlikely to follow.

Mr. EARDLEY HOLLAND considered that the conservation of ovarian tissue *in situ* during the removal of simple ovarian neoplasms should be practised far more widely than it is. It is possible to preserve a piece of ovary in all dermoid cysts, and in all cysts originating from the epöopheron (the so-called broad ligament or parovarian cysts).

As soon as the ovarian tumour is exposed at operation it should be inspected to determine so far as is possible its nature and its relation to the ovarian ligament, to the ovary, and to the peritoneum of the broad ligament. The way to excise a tumour from the ovary is to follow the ovarian ligament into the tumour and to fashion a more or less cup-shaped flap. Evidence of follicles can often be seen at this point. In the case of dermoid cysts the opposite ovary should always be inspected, because dermoids are very often bilateral and I have sometimes split the opposite ovary and have excised a small dermoid cyst no larger than a marble. Even if a very small flap of ovarian tissue can be preserved it may be of the greatest value.

I have notes here of a case of bilateral dermoid cysts of the ovary operated on in 1934. The right cyst was very large and was removed *in toto*; the left ovarian cyst was the size of a tennis ball and was excised, a piece of ovary being left behind and the Fallopian tube also being left intact. A flap was marked out with its pedicle at the ovarian ligament; it was thin but was seen to contain two or three visible follicles. The patient is now six months pregnant.

It is often possible to preserve ovarian tissue in cases of ovarian endometrioma with chocolate cysts. I have had four such cases since 1931, in which the patients have subsequently become pregnant, two of them having given birth to full-time children. One of these is now pregnant for the second time since the operation.

These cases, naturally, have to be carefully chosen, and the patients also have to be selected according to age and so forth. There are, of course, objections to conservative surgery in ovarian endometrioma; but if the operation is unsuccessful and the cysts re-form a second operation can always be performed, or, as I have sometimes done, intra-uterine radium can be used.

Professor MILES PHILLIPS commented on the admirably exhaustive studies they had listened to. He especially welcomed the historical sections, for the reason that such knowledge lessened the tendency to pendulum swinging in medical practice which so often delayed progress in the art of treatment.

Although he had no personal experience of ovarian grafting, he had at times obtained the happiest results by taking pains to conserve even a small piece of an ovary in cases in which the uterus was functioning. On the other hand, when the uterus had to be removed he had formed the

opinion that the woman was, generally, more comfortable without the ovaries. He referred to a girl of 18, whose uterus and appendages were removed for sarcoma botryoides of the cervix. Ten years later she was found to be happily and comfortably married, never having experienced any climacteric disturbance. On the other hand, a woman of 32, after panhysterectomy with conservation of both ovaries at her special request, was tormented for five years by hot flushes which began soon after the operation.

Much depended on the after-management. He felt justified in saying that, on the average, the discomforts of the artificial climacteric were less than those of the natural. If they happened to be troublesome she would be relieved by thinking how much worse they might have been: if they were trifling, as they often were, well, so much the better. He had regretted leaving an ovary, after hysterectomy, in certain cases of tuberculous disease and in some cases of pelvic endometrioma. Dr. Gray Ward's reference to hot Fallopian tubes reminded him that they still awaited reports on the after-results of the operative treatment (slitting up the inflamed Fallopian tubes and pelvic drainage) advocated for acute salpingitis, by certain surgeons at the Manchester Congress in 1927.

With regard to treatment of the lacerated and infected cervix, he strongly advocated inspection of the cervix on the tenth day of the puerperium followed by careful local treatment, by the application of caustics to any granulating surface, until it was soundly healed. In the neglected and chronic cases he had seen great benefit from Hunner's method of repeated applications of the Pacquelin cautery to the surface. In bad cases Sturmdorff's excision of the diseased area gave excellent results and caused no difficulty at a future confinement. In older women or in instances of deep laceration with a large ectropion, amputation of the cervix, together with the vaginal plastic repair, which was often required, was the most satisfactory method. The different methods must be carefully selected for different cases.

He believed that the widespread campaign of amputation of the torn and infected cervix which had developed during the last 20 to 30 years in this country, must provide the explanation of the fact that the uterus was the only organ which had provided a steadily falling death-rate from cancer during the last 15 years, as could be seen in the Registrar-General's Annual Reports.

Dr. BETHEL SOLOMONS, in reply, said that it was his custom to snip adhesive kinks in the Fallopian tube, but if there were gross disease in the isthmial portion either of two procedures could be carried out: (1) the diseased portion was resected and an end-to-end anastomosis performed; (2) the tube was removed as far as the diseased part and a new ostium formed: a piece of catgut was then inserted. These operations did not give very favourable results.

He was interested in, but sceptical about, the results of experiments on rabbits. First, results were not very valuable unless at least a hundred animals were experimented on, and it was difficult to obtain animals in Dublin at present: secondly, it was difficult to keep the field of operation aseptic and full theatre technique must be carried out. There had been enough patent Fallopian tubes in his series of cases and those of other

investigators to continue with his efforts, and he believed that the insertion of tanned catgut was a help. Chromic catgut, as used in the animal experiments referred to by Dr. Browne, acted as an irritant., Silkworm gut was probably best and could be used, but there were definite mechanical difficulties.

He agreed that much information could be gained by injecting the uterus with ethidol in cases of pelvic disease in which the diagnosis was difficult.

He had known several cases in which pregnancy had occurred after burying the Fallopian tubes between the folds of the broad ligament.

Dr. GEORGE GRAY WARD made the following contribution: In America, conservation of the ovaries, Fallopian tubes and uterus, whenever possible and feasible in the childbearing age, is the almost universal rule among gynaecologists. It is my practice to conserve healthy ovarian tissue whenever practical in young women, for the possibility of future childbearing, and also in hysterectomies, unless the patient is at or beyond the menopause. We should also bear in mind that young women whose ovaries have been removed may suffer from a distressing atrophy of the vaginal mucosa as well as the other menopausal symptoms.

Ovarian grafts should be employed if the ovaries cannot be retained *in situ*, but their functional duration is limited to about two years in my experience.

The value of conserving small amounts of ovarian tissue is illustrated by a patient who came to see me some years ago with bilateral ovarian cysts as large as oranges. She was 27 years of age and had been married two years; she had never been pregnant. I removed both neoplasms but conserved a small portion of the outer capsule of the cysts adjacent to the pedicles, and these were sutured to form rudimentary ovaries. She promptly conceived and has a healthy boy now 11 years old.

We all know of similar cases. In 1909 Frank Simpson, of Pittsburgh, made an epoch-making contribution under the title of "The Choice of Time for Operation for Pelvic Inflammation of Tubal Origin." He showed that the prevailing custom of immediate operation in acute salpingitis had a mortality of 20 per cent, while the deferred operation he advocated showed in 456 cases a mortality of only one per cent, and many escaped operation. His rule was that there should be no operation until complete subsidence of acute symptoms, with a normal temperature for three weeks, which was to be tested by repeated bimanual examinations with no resulting rise in temperature.

Jeff Miller, of New Orleans, confirmed the work of Simpson in a study of 600 cases treated both ways in the Charity Hospital, New Orleans, by 57 surgeons. In two-thirds Simpson's rule was not followed, and the analysis showed that operation on hot tubes was four times as fatal as in the delayed group.

Holtz, in a study in the Scandinavian clinics of 1,083 acute cases treated on the expectant plan, showed 82 per cent of complete cures, 12 per cent of pregnancies, and two per cent of failures. In 400 cases operated after complete subsidence of acute symptoms, Holtz's mortality was only 0.5 per cent.

The majority, about 75 per cent, of cases of acute salpingitis are of Neisserian origin, and sterilization of the pus results in 70 per cent if they

are let alone, as the disease is self-limited. We should remember that the clinical course is not the same as in acute appendicitis.

Our experience is that 15 per cent of all cases result in cure without operation if properly treated: as Curtis of Chicago puts it, we operate only for the sequelae, *not* for the infection.

Aldridge, of my staff at the Woman's Hospital, has made an analysis from our records of the results of operation in 977 active and inactive cases of salpingitis, 99 acute and 878 chronic, by 29 surgeons. Eighty per cent of the acute cases were operated with a mistaken diagnosis as follows: Forty-five per cent for chronic salpingitis, 20 per cent for acute conditions, such as suspected ectopic gestation, or torsion of the pedicle of an ovarian cyst, and 15 per cent of cases in which salpingitis was not suspected. The 20 per cent of acute cases intentionally operated were done in the earlier years before our conservative attitude. The mortality in the acute cases was 11.1 per cent, while in the chronic series it was 1.4 per cent. The morbidity was 33.3 per cent in the acute as compared to 11.5 per cent in the chronic. There was an incidence of 19.1 per cent of wound infection in the acute and 6.6 per cent in the chronic cases. The end results were unsatisfactory in 34.1 per cent of the acute and in only 19 per cent of the chronic cases.

I wish to concur in Dr. Solomons's statement that the study of tubal conditions by the injection of lipiodol is not always safe. I have recently had a serious case of bilateral pelvic abscess as a result of this procedure, and Rubin has reported similar experiences.

When sterilization is desired, the technique of burying the fimbriated ends of the Fallopian tubes between the folds of the broad ligament as suggested by Braun, Jenttner, and Selheim many years ago, is a satisfactory method and allows of temporary sterilization, since a subsequent pregnancy may be desired, as reported in a case of Dr. Aldridge at the Woman's Hospital, where, after a divorce and a re-marriage, the abdomen was re-opened and the tubes liberated with a resulting pregnancy and normal delivery of a healthy child.

It is our practice to perform myomectomy in young women whenever the necessary conditions essential for success are present. In the Woman's Hospital, New York, from 1919 to 1935, abdominal myomectomy was done 609 times with a mortality of 0.98 per cent. Vaginal myomectomy was done in 59 cases with a mortality of 1.6 per cent. A patient of mine, aged 33 years, upon whom I did myomectomy for multiple myomata in 1929, has since been delivered normally of three children, the last in February 1936.

We have had numerous other cases of successful pregnancy following the operation. Dr. Aldridge, of my staff, did two Caesarean sections on one horn of a bicornute uterus, the other having been previously removed by Döederlein in Münich.

From 1923 to 1933 there were 13,121 deliveries in the Woman's Hospital. Of these 24 had had previous myomectomy. There were 32 deliveries in these 24 patients with a mortality of two, or 6.25 per cent. Both were Caesarean section cases, one being the third Caesarean section since the myomectomy. The foetal mortality in the 32 deliveries was one, or 3.1 per cent.

DISCUSSION ON DR. JAMES HEYMAN'S PAPER ON "THE RADIUMHEMMET METHOD, TREATMENT, AND RESULTS OF CANCER OF THE BODY OF THE UTERUS."

Professor MILES PHILLIPS asked, with regard to the classification of cancer of the uterus, whether or not Dr. Heyman had considered the advisability and practicability of recognizing isthmial as distinct from cervical and fundal carcinoma.

Professor Oskar Frankl had spoken of this type of growth at the Birmingham Congress, and Professor Phillips had found that cases in which the cancer had apparently arisen in or was confined to this region gave poor and final results after hysterectomy. The pelvic regional glands appeared to be invaded at an early stage. Did Dr. Heyman agree with this opinion? And, if so, would he approve of the use of deep X-rays or radium therapy to the regional glands after hysterectomy in these cases.

Dr. GRAY WARD said that at the Woman's Hospital cancer work is only a part of the general gynaecological clinic, consequently our series is small as compared to a clinic devoted entirely to cancer. We have looked for guidance in the treatment of cancer of the uterus to the Stockholm clinic, and any success we have had has been due to what they have taught us.

In cancer of the corpus uteri our method of choice has been to make a diagnostic curettage and insert 100 milligrams of radium-element to the fundus (two tubes of 50 milligrams in tandem), screened with the equivalent of 1 m.m. of platinum, followed four to six weeks later by complete hysterectomy. A high voltage X-ray series after the Coutard technique completes the treatment. However, 43.47 per cent of our corporeal cases were poor surgical risks due to obesity, senility, cardio-vascular disease, diabetes, etc., so that the hysterectomy had to be omitted.

From 1919 to 1930 inclusive we saw in our cancer clinic 72 cases of corporeal cancer. Of these 65 were treated, seven being too far advanced for treatment. The total patients living after five years are 31, giving an absolute survival-rate of 43.05 per cent and a relative rate of 47.07 per cent.

	Total	Lived 5 years
Cases treated by operation only ...	4	4 (100 per cent.)
Radium alone	46	18 (39.13 per cent.)
Radium and operation	15	9 (60 per cent.)

Of the 46 cases treated with radium alone, 20, or 43.47 per cent, were poor surgical risks.

I believe that accurate statistics can only be obtained by a personal follow-up and that the absolute cure-rate is the only one of real value for comparison.

DISCUSSION ON DR. GRAY WARD'S PAPER ON "RECONSTRUCTIVE PELVIC SURGERY FOR GENITAL PROLAPSE: AN EVALUATION OF PRINCIPLES."

Professor MILES PHILLIPS said: In the first place I feel that I do not owe an apology to the Congress for having joined with the late Professor Blair-Bell in persuading Dr. Gray Ward to devote his address to this subject. Surely there has never been a more thorough and logical consideration of the whole problem of genital prolapse than that we have just listened to. It should be closely studied by all who are concerned with the treatment of this trouble. It is so important to have various methods at one's command to suit variations in the disability. Although the Manchester operation is the one most frequently required, there are certain younger women with sagging bladders and defective control of the urine, together with a desire for more children, who are best treated by a moderate anterior colporrhaphy and a round ligament suspension of the fully retroverted uterus. Even the late Dr. Fothergill himself approved of this procedure in occasional cases.

I discarded the interposition operation some years ago, but I most fully agree with Dr. Gray Ward's views on the advantages of vaginal hysterectomy in not a few cases of procidentia and for the reasons he has given. There is no special difficulty, as Professor Fletcher Shaw argues, in carrying out the most effective plastic repair of the vagina immediately after removal of the uterus. Two special points in his own technique were then advocated: (1) After clamping and dividing each utero-sacral fold each should be ligated and fixed to the adjacent vaginal skin edge by a mattress suture of number 3 plain catgut. These should be tied on the upper, peritoneal, surface, in order that the long ends may, at the end of the operation, be left protruding into the upper part of the vagina; this ensures drainage from the potential space between the closed peritoneum and the vaginal vault; this is a more satisfactory method than the use of gauze or rubber. The utero-sacral folds are sutured together by buried mattress sutures of thick plain catgut. (2) The excess of peritoneum of the enterocele is *not* excised: it is eventrated by suturing the utero-vesical peritoneal edge as high as possible to the posterior wall of the pouch of Douglas. The excluded plaque of peritoneum usefully helps to fill up the space above the vaginal vault. With regard to mortality, the operation, though often an extensive one, involving the incidental removal of small fibroids or ovarian tumours, did not carry any special risk. Professor Phillips's last 150 private cases, since 1925, had all been successful.

Finally, a brief reference was made to the prophylaxis of genital prolapse by improved obstetric practice whereby means are taken (*a*) to push up a cervix, which instead of being drawn up over the presenting head tends to be pushed down by it, (*b*) to relieve an excessive bursting strain on the lower genital canal by a timely division of the perineum, and (*c*) by restriction of the use of the long midwifery forceps to experienced obstetricians of the rank, say, of members of the British College of Obstetricians and Gynaecologists.

DISCUSSION ON DR. LEONARD COLEBROOK'S PAPER ON "THE PREVENTION OF PUERPERAL SEPSIS."

Professor MILES PHILLIPS was filled with admiration and gratitude for Dr. Colebrook's paper. Nothing that could be said in this or any other room would persuade him to omit the use of a face-mask in obstetric practice, any more than he would agree to having his own abdomen opened by a surgeon who did not wear a mask.

The question of discomfort had to be considered, and he advocated the formation of a snout-like projection by means of a stiffened dart on each side of the mask.

Dr. Cruickshank's observation on the high degree of air-infection in a ward devoted to suppurating burns, reminded him that in a certain hospital devoted to compound fractures of the femur during the Great War, the medical and nursing staffs had found it necessary to wear face-masks, of cotton wool in gauze bags, to prevent infection of the air passages. He then referred to the prime necessity of thorough washing, with soap, of the hands of the attendant and of the genitals and adjacent skin of the woman before, during, and after labour. He considered that to this care the East London Maternity Hospital and the Dutch maternity hospitals largely owed their wonderful freedom from septic infection. *Clean hands, clean vulvae, and keep your mouth shut* was their motto—and they do not use masks.

Finally, with regard to Dr. Colebrook's request that all obstetricians should devise means to lessen the incidence of severe trauma, he advocated the restricted use of the long midwifery forceps to specially qualified experts.

DISCUSSION ON MR. A. A. GEMMELL'S PAPER ON "MYOMECTOMY."

In the unavoidable absence of Mr. Victor Bonney, Mr. W. R. WINTERTON said that Mr. Victor Bonney has performed myomectomy 609 times. The tumour was single on 243 occasions and multiple on 366 occasions. The largest number of fibroids removed from an individual case was 125. Seven years later, when the patient was 42 and still unmarried, Mr. Bonney performed hysterectomy, seven new fibroids having formed. There were nine other cases in which the number of tumours removed varied between 50 and 92.

There were seven deaths in the 609 cases, the causes of death being shock on two occasions, pulmonary embolism on two occasions, secondary haemorrhage on one occasion, paretic obstruction on one occasion, and sepsis on one occasion.

There have been no deaths in the last 200 cases. These results are largely due to the use of his myomectomy clamp.

In 1931 Mr. Bonney published his results up to that date in a Hunterian Lecture at the Royal College of Surgeons.

He found that fibroids had recurred in five per cent of the cases, but in only three per cent was another operation performed.

Recurrence is most likely when a large number of fibroids is found in

a relatively young woman, but these are just the cases in which conservation of the uterus is most to be desired.

Of 77 women within the childbearing age who wished to conceive and were in a position to do so, 30 conceived (39 per cent) and 75 per cent of the deliveries were normal.

In one case he removed 19 fibroids when the patient was 27 years of age. When she was 36 he removed six more and also enucleated blood-cysts from both ovaries. When she was 40 years of age she conceived for the first time and was delivered of a living child by Caesarean section.

Another case may be quoted, in which he performed bilateral salpingostomy, enucleated blood-cysts from both ovaries, removed six fibroids from the uterus, and excised an adenomyoma from the uterine wall. This patient subsequently conceived.

Obituary

Dr. T. B. GRIMSDALE

An Appreciation.

By the death, suddenly, at Seaton, Devon, of Dr. T. B. Grimsdale, a long and eminent family medical connexion with our city [Liverpool] comes to an end—a connexion dating from 1848, when his father, the widely known Dr. T. F. Grimsdale, began his brilliant career in Liverpool.

Dr. T. B. Grimsdale, who followed his father in residence at 29 Rodney Street—a Grismdale home since 1862—used to say facetiously that he was "the oldest inhabitant of Rodney Street." In those days the doctors had their living homes, not merely their professional offices, in that street of renown.

Following his father as a gynaecological surgeon, Dr. T. B. Grimsdale speedily became one of the leading surgeons in this department, first on the staff of the Liverpool Hospital for Women and, later, on that of the Royal Infirmary, to which he was appointed gynaecological surgeon in succession to the late Professor John Wallace.

It was shortly after this appointment that he entered upon an intensive struggle which is now historic. Convinced, from observation of the work of others and the results of his own experience, that aseptic methods should supersede those of the older antiseptic practice, he set himself zealously to have the new take the place of the old.

In this endeavour he was strenuously opposed by certain of his senior colleagues, notably by one who had the ear of the then committee. New-fangled ideas, especially when they involved considerable initial expense, did not find favour, and for a time it seemed that the suggested new enterprise must go to the wall. But Grimsdale, strong in the right of his cause, kept fighting on, an unremitting fight against continued opposition from high quarters, until he won on every point, and was successful in getting the new regime established, What is now taken as a matter of course involved the pioneers in a struggle against prejudice almost unbelievable. It is gratifying to be able to record that eventually his chief opponent admitted with all chivalry that he was wrong and Grimsdale right.

During the Great War he waived his speciality and gave most valuable surgical help to the St. John Ambulance Brigade V.A.D. Hospital in Liverpool, coming to the aid of the heavily overworked surgeon to the hospital, the late Mr. George P. Newbolt. He gave his services most willingly, especially as he had formerly held the rank of surgeon-captain in the old Volunteer days.

Honours and decorations held no attraction for him—not that he deprecated them, but simply that they did not appeal to him personally. He was content to do the work simply for the sake of the work. He retired from the staff of the Royal Infirmary in 1921, and shortly afterwards went to live in the South.

Dr. Grimsdale came of a gifted family, and inherited considerable artistic talent. One of his favourite recreations was to occupy himself during the periods of post-prandial eloquence with making sketches of his fellow-diners. Some of these are still extant in proof of his gift. In his time an active sportsman, he was on occasion in the reserve for inclusion in his county eleven. Later he was captain of his golf club.

In his professional work he was noted for his scrupulous attention to detail; indeed, he was meticulous to the last degree, and could not tolerate the slightest carelessness on the part of his assistants, whether doctors or nurses. He was noted equally for his courtesy and his imperturbability. He never allowed himself to be "fussed"—and he was always the perfect gentleman.

To assist him in his operative work was in itself an education in the technique of abdominal surgery. I very often had this privilege, and I have frequently said that I have never assisted him but I learned something in the minutiæ of technique that I had not known before.

In religious activities Dr. Grimsdale was for some years a sidesman at the Church for the Blind, when the late Rev. T. W. Lund was the incumbent. He leaves a widow.

W. M. C. in *Liverpool Daily Post.*

16th March, 1936.

For nearly 40 years I was privileged to number the late Dr. T. B. Grimsdale as one of my most intimate friends. We met frequently—at the meetings of the North of England Obstetrical and Gynaecological Society, and on golfing excursions, and also on longer holidays. I had thus many oppor-

tunities of getting to know his views in reference to aseptic surgery and the history of the part he played in advocating and carrying through the establishment of his methods in the Liverpool Royal Infirmary. I can, therefore, fully corroborate the account given by "W.M.C." in the *Liverpool Daily Post* of March 16th. One of the problems was the sterilizing of dressings and swabs and towels. As he got no support from the Medical Board he purchased and installed at his own expense a Kny-Scheerer steam sterilizer, which came from America. This was placed in his small operating theatre, and for some years, I believe, was the only one in the Infirmary.

Another point that engaged his attention was the sterilizing of his own hands and of that of all those who assisted at his operations. He used permanganate of potash for this purpose. The hands and arms were washed with scrupulous care. Then the arms were plunged into a saturated solution of permanganate. This stained the skin a deep mahogany colour, which enabled one to see if any part of the surface had been missed. Then the arms were soaked in a hot saturated solution of oxalic acid, which restored them to their normal colour. Then sterilized water was used to rinse off the oxalic acid. This method he used for years—in fact, I am not sure that he ever gave it up, even after rubber gloves, which he used, had come in. I remember he told me that on one occasion he asked the pathologist of the Infirmary to bring some cultures of pathogenic organisms, and with these cultures he and his house surgeons and his theatre sister covered their hands and allowed them to dry. They all then underwent the permanganate preparation, and the pathologist took scrapings from the hands and was unable to raise a culture from any of the group. I may state that I had such confidence in this method that I adopted it and used it for many years, both in hospital and private practice.

Apart from his work on the general principles of surgery, he devoted much attention to the technical side of his work. He spared no pains in trying to perfect his manipulative skill. He taught himself how to tie knots in a deep recess with one hand, and he practised the methods of delicate suturing. But he was opposed to all operations of a more or less fantastic description, many of which were common in his day. As one would expect from the care he took in essentials and in details, his results in major operations were exceptionally good. Dr. Grimsdale wrote comparatively little considering his wide experience; but his persistent advocacy of aseptic methods eventually carried weight

and inaugurated a new era in Liverpool surgery. He was the very last person to advertise, and he cared nothing for public distinctions. But those medical men who sought his advice and help as a consultant were united in admiration of his well-balanced judgment and of his skill.

In private life Dr. Grimsdale had a most attractive personality. One felt that he was a man to be relied on. Apart from his work in surgery he had many interests. He was keen on fishing, and in earlier days he visited some of the sea lochs in the North of Scotland and in the Hebrides. He was a good cricketer when at Uppingham and played for Liverpool clubs for some time after he settled down. He excelled at golf, and in later years he generally spent his spring holidays with a small party of Liverpool golfers. He kept on with the game until within a few months of his death. He had had many interesting experiences, with which he entertained his friends, and always there was a fund of quiet humour. His health was wonderfully good until last October, when he had a serious illness in Liverpool. After his return to Seaton he seemed to improve, but the end came suddenly and painlessly in March, in his 80th year.

ARCHIBALD DONALD.

BOOK REVIEWS.

"The Toxaemias of Pregnancy," by LOUISE MCILROY, *D.B.E., LL.D.*, M.D., D.Sc., F.C.O.G., M.R.C.P. (Lond.). (Edward Arnold & Co., 1936.) Pp. 355. Price 14*s*.

IN this country the monograph dealing with a specialized subject, and addressed to specialists in that subject, has been rather neglected in favour of the more general textbook for students and practitioners, and for such references one has mostly to go to American or European sources. The appearance of a monograph, therefore, devoted entirely to the consideration of the toxaemias of pregnancy, by an authority of the class of Dame Louise McIlroy is very welcome, especially as it is emphasized in the preface that the book is not intended for undergraduates, but for more senior workers. The book, which extends to 355 pages, is divided into eight sections, and the first of these deals with maternal and foetal mortality in the toxaemias, while in the second section the main theories regarding the causation of toxaemia, and the important matter of classification, are discussed. The third section deals with hepatic and renal functions in pregnancy, and the fourth with nutrition. In section number five the symptoms and signs are discussed, while an important sub-section deals with ocular disturbances in toxaemia. The following section discusses renal impairment, while in section seven urinary and haematological investigations are clearly described. The last section deals with the treatment of toxaemia, and of renal disease; it is followed by a summary and by a lengthy and most useful bibliography which indicates the wide extent of the writer's reading.

The scope of the work is thus ambitious, and as Dame Louise has made no claim to any great original contributions, criticism of her findings is rather disarmed. Like most investigators in this field, she is acutely conscious of the many gaps in our knowledge of the various conditions roughly classified together as toxaemia, and one of the main objects of the work is stated to be the demonstration of these gaps; in this it can be said that she has well succeeded. The recent advances in blood tests, urinary investigations, and in endocrinology have been set out in a well-balanced and orderly manner.

Dame Louise emphasizes that, although these various conditions are described as toxaemia, no specific toxin has yet been demonstrated, but the presence of some toxic substance in the circulation is continually presupposed, which might act in the earlier stages causing interference, especially with hepatic function, and with sickness as its main symptom, or in the later stages when it may affect the renal tissue as the nervous system. On the other hand, she is evidently attracted by the conception of toxaemia in pregnancy as a deficiency disease.

Throughout, as regards treatment, she rightly emphasizes the importance of appropriate palliative medical treatment, and the dangers of unskilled surgical intervention. Thus, in hyperemesis, while she discusses fully the recent chemical and dietetic investigations, she recommends reassurance, separation from too sympathetic friends, and a reasonable diet in an

institution; but in the rare toxic cases she very properly advises only one line of treatment—immediate termination of the pregnancy. In severe toxaemia treatment is held to be based on the administration of glucose, calcium and alkalis, and the *rôle* of each of these agents is fully discussed.

The sections on weight variations and ocular changes in toxaemic pregnancy are of particular interest, and are well summarized. The format of the book is good and the print easily readable; a few minor typographical errors are to be found, such as "Hutchinson" instead of "Hutchison" in footnotes to pages 239 and 269, while "Ardwyn Evans" on page 245 should be "Arwyn Evans", but these are of little account.

Throughout the author emphasizes the importance of clinical investigation, and rightly notes the importance of the opportunities for this in the antenatal clinics.

While it cannot be said that the book has thrown much more light on the obscure subject of toxaemia, Dame Louise has performed a definite and useful service in so industriously assembling the more recent advances, and in presenting the position of our knowledge, or lack of it. In this way the monograph will represent a useful reference for a number of years to those who are interested in the more advanced aspects of the subject, and it can be cordially recommended.

G.I.S.

"Urology in Women" (2nd ed.), by E. CATHARINE LEWIS, M.S., F.R.C.S. (Baillière, Tindall & Cox.) Pp. viii + 100; Figs. 31. Size 9" × 6". Price 6*s*.

THE second edition of this little book has been brought up to date by the addition of sections on vesical neck obstruction in women and endometriosis, as well as by certain modifications in other chapters.

It remains a well-written and well-illustrated volume, containing much useful information which it is difficult to find collected together elsewhere.

It is rather surprising to find no account of the mandelic acid treatment of urinary infections, although the ketogenic diet is described. Nor is the value of dilatation of the bladder in persistent chronic cystitis given any place—in fact it is stated that nothing is to be gained by stretching the bladder; this, however, is a point on which there is still a difference of opinion among urologists.

We can thoroughly recommend this clear account to all who have to confront the difficult problems of urology in women.

E.W.R.

"Adventures Before Birth," by JEAN ROSTAND; translated by JOSEPH NEEDHAM. (Victor Gollancz Ltd.) Price 4*s*. 6*d*. (cloth); 3*s*. 6*d*. (paper).

THIS book is addressed to the intelligent lay person who wishes to acquire some knowledge of the facts of reproduction and embryology. Obvious difficulties must be encountered in writing this type of book, not the least of which is the necessity for using simple language. Both author and translator have succeeded admirably in overcoming these difficulties, the meanings of

the few scientific terms used being explained in a short glossary at the end. The author must also be congratulated on presenting, in attractive guise, facts that are too often rather drearily expressed.

F.H.H.F.

"Manual of Emergencies," by J. SNOWMAN, M.D. (John Bale, Sons, and Danielsson Ltd.) Price 10s. net.

IN this small book of 380 pages, 70 pages are devoted to the pathology, diagnosis, and treatment of the following conditions: haemorrhage in pregnancy, ectopic gestation, retroflection of the gravid uterus, eclampsia, embolism, and asphyxia neonatorum. It might have been expected that with such small space at his disposal, the author would have concerned himself with the practical aspect of such emergencies, and that he would have subordinated his theoretical views upon the requirements of treatment. The title might also induce the reader to seek guidance out of the ripe wisdom of an experienced clinician and operator, but if the reader entertains any such hope, he is doomed to disappointment.

It is impossible to recommend this book as a guide to the student or to the practitioner who is confronted with the treatment of a difficult obstetric case, and there is little internal evidence to suggest that the author has even a sound theoretical knowledge of his subject.

Much, if not most, of the material is accessible in the smaller textbooks, and even then it would appear that the author has not always had the advantage of consulting the latest editions.

In almost every section of this work there is some teaching or advice to which serious exception may be taken.

It is stated that an appreciation of the early development of the ovum is necessary in order to understand the details of an abortion at the various stages of pregnancy, and then we are told that during the first four weeks of pregnancy the embryo is nourished entirely by the yolk.

For the treatment of inevitable abortion, when the finger is able to detect the lower pole of the ovum, the appropriate treatment is to give an anaesthetic and plug the vagina, although in a great emergency the most rapid method of arresting haemorrhage is to apply tenaculum forceps so as to grasp both lips of the cervix and to leave the instrument in position. The use of ergot is deprecated on the grounds that this drug may cause the uterus to contract firmly around the ovum and prevent its expulsion. It is recommended that a four months' abortion should be dealt with by miniature Caesarean section.

In regard to the diagnosis of hydatidiform mole, the author regards one of the pathological features to be the detection of cysts by the finger introduced through the cervix. For the treatment of this condition ergot is recommended as essential, but no reference is made to the desirability of keeping the patient under observation or for the subsequent employment of the curette or the Aschheim-Zondek reaction.

For the treatment of accidental haemorrhage, Champetier de Ribes's bag is strongly and repeatedly recommended, although it is stated that abdominal hysterectomy is agreed to be an ideal method for those cases in which there has been great intra-uterine bleeding.

Throughout this work the author shows a predilection for methods which are all but obsolete; he devotes nearly a whole page to the description of the method of introducing Champetier de Ribes's bag: he constantly recommends plugging the vagina and even the uterus with ribbon gauze.

For placenta praevia, plugging the vagina and the introduction of a bag or laminaria tents are given pride of place; bipolar version is looked upon with favour, but the use of Willett's forceps is dismissed in three lines with the remark that this method is an alternative to De Ribes's bag in suitable cases.

The section dealing with post-partum haemorrhage is largely theoretical, and, in any case, completely confusing from the practical point of view. We are told that bleeding from the uterine arteries is unmistakable and that the blood flows out of the vagina like water from a spring, the stream being as thick as a little finger. We are also told that it is notorious that a parturient woman may lose several pints of blood and then make a rapid recovery. We are not given any clear instructions in regard to the proper practical methods for dealing with this dangerous complication of labour, indeed the author mentions with a seriousness that is scarcely credible, that for atonic uterine haemorrhage, traction upon the anterior lip of the cervix with a volsellum may reduce bleeding or check it entirely.

The quality of this book is sufficiently obvious from the quotations already given, and it is, therefore, not surprising to learn that in cases of retroflexion of the gravid uterus the urethra may be so obstructed as to render catheterization impossible and paracentesis of the bladder necessary, or that leeches should be applied to the sternum for the relief of cyanosis due to pulmonary embolism, or, finally, that the best method of artificial respiration for cases of white asphyxia is undoubtedly that devised by Schultze.

The part of this book dealing with obstetrics has very evidently not been written by a practical obstetrician, and much of the advice contained therein in regard to the treatment of obstetrical emergencies is either worthless or positively dangerous.

A.L.R.

Second All India Obstetric and Gynaecological Congress

(Raj Bhuvan, Sandhurst Road, Bombay, 4)

The SECOND ALL INDIA OBSTETRIC AND GYNAECOLOGICAL CONGRESS will be held in BOMBAY about Christmas, 1937.

The following are the subjects selected for the main discussion:

(*a*) Toxaemia in Pregnancy.
(*b*) Cancer of the Cervix.

The exact time and programme will be notified in due course.

C. M. Mehta, Hon. Secretary.

Bombay Obstetric and Gynaecological Society.

International Congress for Obstetrics and Gynaecology

Amsterdam, May 4th—8th, 1938

The Holland Gynaecological Society at Amsterdam, in celebration of its Fiftieth Anniversary, has decided to organize **an International Congress for Obstetrics and Gynaecology at Amsterdam** in 1938.

The last International Congress for Obstetrics and Gynaecology was held at Berlin in 1912. Particulars regarding the forthcoming International Congress will be published in this Journal in due course.

Review of Current Literature.

Director: FREDERICK ROQUES, M.A., M.D., M.Chir. (Cantab), F.R.C.S., M.C.O.G.

THIS Review contains the lists of contents and abstracts of the more important articles from the following journals with which the "Journal of Obstetrics and Gynæcology of the British Empire" exchanges :—

British.—The Lancet; British Medical Journal.

Canadian.—The Canadian Medical Association Journal; Bulletin Médical de Quebec.

Australian.—Medical Journal of Australia; The Australian and New Zealand Journal of Surgery.

Indian.—The Calcutta Medical Journal.

American.—American Journal of Obstetrics and Gynecology; The Journal of the American Medical Association; Surgery, Gynecology and Obstetrics; American Journal of Diseases of Children.

French.—La Gynécologie; Gynécologie et Obstétrique; Bulletin de la Société d'Obstétrique et de Gynécologie de Paris.

Belgian.—Bruxelles Médical.

Italian.—Annali di Obstetrica e Ginecologia; Archivo di Obstetrica e Ginecologia; Revista Italiana di Ginecologia, Bologna.

German.—Archiv für Gynäkologie; Zeitschrift für Geburtshülfe und Gynäkologie; Zentralblatt für Gynäkologie; Monatsschrift für Geburtshülfe und Gynäkologie; Münchener Medizinsche Wochenschrift; Monatsschrift für Krebsbekampfung.

Scandinavian.—Acta Obstetrica Scandinavica.

South American.—Boletin de la Sociedad Obstetricia y Ginecologia de Buenos Ayres.

Japanese.—Japanese Journal of Obstetrics and Gynæcology.

The Review of Current Literature thus keeps the readers of the Journal in touch with current literature throughout the world. At the end of the year an Index of all the subjects contained in the articles of the above journals is printed. Arrangements are also made to include abstracts of important articles on border-line subjects, such as Physiology, Biology and Biochemistry.

LIST OF ABSTRACTORS.

London: J. BEATTIE, F.R.C.S.; A. C. BELL, F.R.C.S.; R. K. BOWES, F.R.C.S.; J. LYLE CAMERON, F.R.C.S.; A. H. CHENARD, M.B.; R. L. DODDS, F.R.C.S.; R. C. LIGHTWOOD, M.D.; D. H. MACLEOD, F.R.C.S.; J. A. MOORE, M.B.; C. D. READ, F.R.C.S. (Edin.); F. ROQUES, F.R.C.S.; R. WINTERTON, M.D.

Huddersfield: W. E. CROWTHER, M.B.

Leeds: R. H. B. ADAMSON, M.D., AND B. JEAFFRESON, F.R.C.S.

Liverpool: M. DATNOW, M.D.; P. MALPAS, F.R.C.S.; T. N. A. JEFFCOATE, F.R.C.S.

Manchester: R. NEWTON, M.D.

Glasgow: JANE H. FILSHILL; R. SHARMAN, M.D.

Archiv für Gynäkologie.

Band 159, Heft 4.

The significance of tissue nutrition (histiotrophy) in the intra-uterine carbohydrate metabolism of the embryo. B. Szendi and G. Papp.

The origin of congenital defects. L. Brings.

Ovarian hormones and carbohydrate metabolism. Part I: Ovarian hormones and the blood-sugar. Part II: The action of ovarian hormones on the glycogen content of the liver. E. de Amilibia, M. M. Mendizábal and J. Botella-Llusiá.

*Pathology of the liver in puerperal sepsis. P. L. Ssuchinin and A. N. Morosowa.

*Sarcoma in the cervical stump after supravaginal hysterectomy for myoma. R. Reckmann.

*Hydrosalpinx after sterilization operations by crushing and ligature of the Fallopian tubes. T. Koller.

Consecutive morbid conditions of the kidneys in patients surviving toxicoses and the influence of later pregnancies on the residua of renal gestoses. G. Effkemann.

Premature labour and the premature infant. A. J. N. Duyzings.

Increased blood-pressure as a sign of endocrine disturbance in myoma E. Strasmann and R. Phillipp.

The effect of hypophysectomy on the development of the ovarian follicle and of the corpus luteum in animals previously treated with prolan. O. Macchiarulo.

Clinical and experimental studies concerning albumiuria of pregnancy and eclampsia (adrenal content, blood-sugar and blood-pressure). O. Macchiarulo.

*Pregnancies after operation for ovarian carcinoma. Z. v. Szathmáry.

Concerning thyroid function in pregnancy and the demonstration of thyroid hormone at that time. W. Neuveiler; also reply by K. J. Anselmino and F. Hoffmann.

Band 159, Heft 5.

—*Clinical features and causation of the Brenner tumour. E. Fauvet. — 159; 585-611, 1935

Culture of trichomonas vaginalis hominis and transference to small laboratory animals. H. Wittvogel.

*Delmas's method of delivery: with notes concerning the innervation of the uterus and the place of spinal anaesthesia in obstetrics. O. Bittmann.

—*The clinical significance and pathology of ovarian teratomata. Z. v. Szathmáry. — 159; 653-670, 1935

*Histogenesis of endometrioma: an unusual localization in the middle of the thigh. S W. Mankin.

*Clinical significance of dermoid carcinoma. Z. v. Szathmáry.

The order of appearance and development of centres of ossification in the foot of the foetus. G. A. Bakscht and T. N. Siltschenko.

The Staub-Traugott dextrose test in pregnancy and the puerperium as a measure of insular function. B. Kriss and S. Hirschhorn.

Modifications of fat metabolism before uterine contractions in normal pregnancy, in connexion with natural induction of labour. G. Effkemann.

*A rare developmental anomaly of the neck (Klippel-Feil syndrome). A. Weninger.

Band 160, Heft 1.

Studies concerning cholesterin metabolism in the newborn: with a note concerning icterus neonatorum. O. Mühlbock.

*Physiology and mechanics of the first stage of labour. F. Jacobs.

The haemato-encephalic barrier in inflammatory diseases of the female genitalia. H. Hoffmann.

*Quantitative hormone estimations in chorion-epithelioma and hydatidiform mole. J. Ruzicska.

Ammoniacal silver solutions in the treatment of vulvo-vaginitis due to trichomonas. E. Werbatus and L. S. Kritschewsky.

Limitations of home midwifery in morbid conditions of the third stage of labour. C. Holtermann.

*Present-day knowledge concerning the prognosis of spontaneous delivery and operative labour in flat pelvis measured by X-rays. Liepelt.

The question of placental activity as a specific organ. A. Bartels, E. Petrowa, and E. Gargariinskaja.

Observations concerning renal activity before birth. S. Tapfer.

Treatment of eclampsia by magnesium sulphate solution. D. P. Browkin.

Induction of a secretory phase in the endometrium of the rabbit (corpus luteum hormone activity) by placental extract. C. v. Lankeren.

Status of the vaginal flora, hydrogen-ion concentration and determination of sex. K. Zinram.

The significance of epithelial inclusion-bodies in gonorrhoea in the female. M. Spitzer.

Neuro-histological studies of the ovary. H. Goecke and J. Beaufays.

Concerning pregnancy lipaemia. I. Zoltan.

PATHOLOGY OF THE LIVER IN PUERPERAL SEPSIS.

In this paper 41 cases of puerperal septicaemia or pyaemia are studied. A severe infection of the liver was denoted in all by hepatic enlargement or tenderness, jaundice, urobilinuria and/or excessive bilirubinaemia; in the great majority by a pathological curve of alimentary glycaemia accompanied in the same test by a great increase of polypeptide-nitrogen; and in the 17 cases coming to autopsy by degeneration and inflammation in the parenchyma, as well as cellular infiltrations, of reticulo-endothelial origin, along the radicles of the portal vein. One case in five showed well-marked perihepatitis, and autopsy cases showed evidence of a progressive disappearance of hepatic glycogen. It is concluded that puerperal sepsis is accompanied by severe hepatic insufficiency; and that, therefore, in treatment an important part is played by diet, breathing exercises and insulin-dextrose treatment.

SARCOMA IN THE CERVICAL STUMP AFTER SUPRAVAGINAL HYSTERECTOMY FOR MYOMA.

Reckmann describes a case of spindle-cell carcinoma in the stump of the portio. Seven months after supravaginal amputation for a large necrotic submucous myoma an equally large necrotic tumour, having the macro-

scopic and microscopic characters of a myoma, was found growing from the cervical stump and filling the vagina. It was removed, and X-rays were applied in a castration dose. Six weeks later the vagina was again filled by a necrotic tumour, having the appearances, microscopically confirmed, of a sarcoma. Probably the preceding tumour, and possibly the original one, had contained sarcomatous elements.

HYDROSALPINX AFTER STERILIZATION OPERATIONS BY CRUSHING AND LIGATURE OF THE FALLOPIAN TUBES.

Formation of a hydrosalpinx as a late sequel of sterilizing operations is common in animals but rare in human subjects. Three cases are here described. In the first patient, shortly after a gonorrhoeal infection, Madlener's operation was done on the right and double crushing and ligature on the left: a double hydrosalpinx, very large on the left, necessitated operation six years later. In the second, about a year after acute salpingitis triple crushing and ligature of the Fallopian tubes were done during the seventh week of pregnancy: operation for right hydrosalpinx was required eight years later. In the third, on operation for left tubal pregnancy, the right Fallopian tube showed inflammatory thickening and one centimetre of the outer end was removed and ligatured with silk: operation for twisted right hydrosalpinx had to be done 12 years later. The following recommendations are made. No operation for sterilization should be done until the temperature, the white-cell counts and the erythrocyte-sedimentation rate have been proved to be normal: and unless at least eight weeks have passed since a labour, abortion or general illness. A still longer waiting period is necessary after thrombotic illnesses or inflammation in the genital organs. The most careful peritoneal toilet is requisite. The operation, which should be as simple as possible, must nevertheless cause at least 1.5 centimetres' breach of continuity in the inner part of the Fallopian tube and must leave the pars ampullaris and fimbrial end intact (at Zürich since 1934 subperitoneal resection without ligature has been done). If operation shows tubal inflammation or the possibility of occlusion in the ampullary portion or at the abdominal ostium, the procedure indicated is total resection of the Fallopian tubes, possibly combined with excision of a wedge of the fundus uteri.

PREGNANCIES AFTER OPERATION FOR OVARIAN CARCINOMA.

Von Szathmáry, in a discussion of the widely differing views which are held regarding the indications for radical or conservative interventions in unilateral ovarian carcinoma, states that at v. Toth's clinic it is the practice, in patients aged less than 40 who desire children, to leave the uterus and the healthy ovary *in situ*, provided no metastases are found and the tumour is easily removable or pedunculated. In metastatic carcinoma or chorion-epithelioma the uterus and the other ovary are removed irrespective of the patient's age. Three cases are described, out of eight instances in which one followed unilateral extirpation of an ovarian cancer in married women of child-bearing age, of pregnancy after conservative operation. In the first two living children were born after operation: in the second the operation had been followed by X-radiation of the diseased side, and

a healthy child was born after the patient, then aged 40, had had six years' amenorrhoea; in the third, labour occurred in the fifth year after operation.

CLINICAL FEATURES AND CAUSATION OF THE BRENNER TUMOUR.

Described by Brenner in 1907 as "oöphoroma folliculare," the tumour, although that name is now known to be incorrect, is more common than was first thought. R. Meyer in 1932 reviewed 21 cases, and with the four here reported, about 50 are now known. Fauvet's cases all belonged to R. Meyer's second group, i.e. they occurred as solid tumours with or without cyst formation, not in the wall of an ovarian cystoma: an analysis supports the view of Schiller that Brenner tumours take origin in the rete ovarii, and Fauvet is convinced that outside the ovary the Brenner tumour does not occur. The characteristic feature of the Brenner tumour is the presence in a cellular connective tissue of strands of indifferent epithelium, of which some show a central cavity which may be lined by cylindrical cells giving a positive test for mucus when stained with mucicarmine. In Fauvet's first case the patient had one child and was aged 41; the clinical history pointed to myoma; and Brenner's tumour was present in both hilum and medulla, in association with a superficial heterotopic node of endometriosis. In his other cases there was a certain amount of evidence of an association of the tumour formation with modified hormonic balance. The second, who had one child and was aged 41, after a few months' retardation and diminution of the menses had irregular bleeding and mammary signs pointing to rejuvenation, so that one of the adnexal tumours, before operation, was suspected to be a granulosa-cell tumour. The small Brenner tumour of one ovary was almost entirely solid: the other ovary contained a small haematoma of the corpus luteum. Contrary to expectation, no glandulocystic hyperplasia was found in the endometrium. In the third patient, a woman aged 53, who had pressure symptoms, a subserous myoma was associated with a Brenner tumour as large as a billiard ball; there were post-climacteric bleedings and the endometrium was polypoid. In the fourth patient, who was 13 years beyond the menopause, it happened that the uterus could be proved to have increased greatly in size during the past two years, in conjunction with the appearance of a small Brenner tumour and recurrence of uterine bleeding. Pre-operatively a granulosa-cell tumour was suspected. The endometrium, although polypoid, showed no signs of recent proliferation, but there was some cystic dilatation of the basal glands: the myometrium was hyperplastic. Fauvet concludes that there is neither clinical nor microscopical evidence that the Brenner tumour is the source of hormonic reactivating or rejuvenating substances: possibly, however, it is to be attributed to extragenital endocrine stimuli, possibly from the adrenal cortex.

DELMAS'S METHOD OF DELIVERY: WITH NOTES CONCERNING THE INNERVATION OF THE UTERUS AND THE PLACE OF SPINAL ANAESTHESIA IN OBSTETRICS.

Bittmann is pleased with his trial of Delmas's method in 108 cases, 66 primiparae and 42 multiparae; dilatation was effected more quickly in the

former. There was a maternal morbidity of 8.3 per cent and there were three deaths—one in an eclamptic, one in a patient with valvular cardiac disease and recent endocarditis, and one in a case of placenta praevia. The last-named death is attributed to the method, and placenta praevia is taken as a contra-indication to Delmas's procedure, in which the spinal anaesthesia induces a serious fall in blood-pressure. Another contra-indication is the presence in multiparae of old cervical scars. Such a scar became the site of a further tear in six cases out of the 42: there were no tears in primiparae. In eclampsia Delmas's method is described as particularly useful when rapid evacuation of the uterus is called for, and the fall of blood-pressure after injection of the spine is of therapeutic utility. The infants from 105 single and three twin births survived with three exceptions. There was only one case of atonic post-partum haemorrhage, and convalescence was quicker than after spontaneous labour. Bittmann recommends to the practitioner spinal anaesthesia for obstetric operations done in the patient's house, but does not recommend the Delmas procedure except in institutional practice, in which it should be reserved for experienced and skilful hands.

THE CLINICAL SIGNIFICANCE AND PATHOLOGY OF OVARIAN TERATOMATA.

The material of v. Szathmáry in Budapest gives a frequency of 16.6 per cent of teratomata among 1,005 proliferative ovarian tumours. Of the 167 teratomata 158 were cystic (dermoids), eight partially cystic and partially solid, and only one was a true teratoma in the sense of a malignant tumour of embryonic tissues. A considerably higher frequency is reported from Finland, 25 per cent, and Japan, 27 to 35 per cent, and in negro races. The tumour was unilateral in 87 per cent, multilocular in 10 per cent, as large as, or larger than, an apple in 90 per cent, contained long hairs in 90 per cent, bone in 31 per cent, and teeth in 18 per cent. The series included six cases in which the tumour's bed contained nerve-tissue, which has recently been reported to show in these cases an invasive faculty in contrast with the absence of histological signs of malignancy; and 10 in which thyroid tissue was present—including one in which signs of thyrotoxicosis disappeared after removal of the dermoid. In 10 cases a dermoid co-existed with another tumour in the same ovary: in three with a non-dermoid tumour in the other. Two-thirds of the patients reported pain, but menstruation was normal in 79 per cent of menstruating patients. Five per cent had ascites, usually associated with torsion of the pedicle, and no fewer than 13.3 per cent came to operation during pregnancy. Diagnosis was not usually very difficult and was aided in some cases by X-ray detection of teeth. Abscess-formation complicated only four cases, and there was no example of rupture with aseptic peritonitis. In three cases the dermoid had become carcinomatous, and in three a carcinoma had formed independently in the same ovary. Radical hysterectomy is advised for the dermoid-carcinoma combination, but conservative operation for the gliomatous dermoid. The mortality in this series of 158 operations for dermoid cyst was two—one from ileus, one from embolus.

HISTOGENESIS OF ENDOMETRIOMA: AN UNUSUAL LOCALIZATION IN THE MIDDLE OF THE THIGH.

A woman with two children, aged 33 years, six months after a fall noticed a swelling which attained the size of an egg on the front of the right thigh 25 centimetres below Poupart's ligament: it became swollen and painful about the menses. It was removed at another clinic, so that no microscopic report is available, but recurred; a second excision proved it to be an endometrioma. Such a case, like that of the perineal endometrium, appears difficult to explain by the sero-epithelial theory of Lauche, R. Meyer and Heim: that theory would seem further shaken by Chlopin's finding (*Arch Exper. Zellforsch.* XV, 1934) that the mesothelial cells said to be concerned constitute a completely determined tissue incapable of further differentiation. For Mankin the old question of the causation of endometrioma is solved. The source of the tumour is found in fragments of normal endometrium, not menstrual fragments, which become implanted elsewhere (1) after retrograde passage through the Fallopian tubes, (2) by accidental transference at operation, or (3) through the lymph-stream. In this way all locations of heterotopic endometrioma are explicable and no other theory will explain them all.

CLINICAL SIGNIFICANCE OF DERMOID CARCINOMA.

This rare condition, of which some 75 cases have been reported, and the frequency is about three per cent among dermoid cysts, is most common beyond the menopause, is not frequently associated with ascites and has no clinical features in the early stages which differentiate it from a benignant cystic teratoma. Probably many cases of sarcoma and endothelioma formerly described as dermoids were in reality carcinomatous. Three cases of primary and three of secondary dermoid carcinoma are described. The first group included two of squamous-cell carcinoma and one of carcinoma of the thyroid inclusion: all probably proved very quickly lethal. In the second group secondary invasion of the dermiod had occurred from a papillary adenocarcinoma in two cases and a granulosa-cell tumour in the other. In this last the patient survived operation for 12 years.

A RARE DEVELOPMENTAL ANOMALY OF THE NECK (KLIPPEL-FEIL SYNDROME).

Two cases, possibly the first, are described in which this anomaly was noted in the newborn. The signs are impaired head movement, shortness or absence of the neck, a reduction in the number and a compression together of the cervical vertebrae, and usually a cervical *spina bifida*. Intelligence is not usually affected and life may not be cut short: the first case was described and radiologically proved in a man aged 46 years (Klippel and Feil, 1912: *Nouv. Iconogr. Salpetriere*, No. 30, p. 225). Of the infants whom Weninger describes, one lived six weeks and the other, in which one forearm was rudimentary, one day. Radiologically the cervical spine consisted of four or five compressed segments—probably the precursor in infancy of the *masse cervico dorsale*, or cervical synostosis described in those attaining maturity.

PHYSIOLOGY AND MECHANICS OF THE FIRST STAGE OF LABOUR.

Jacobs denies the accuracy of the view that in labour only the corporeal muscles contract while the lower segment and cervical muscles remain passive and are stretched. It is disproved, he maintains, by the following arguments: (1) it is imrobable that the smooth muscle of the lower part of the uterus should behave passively while that of the upper part, with which it has such an intimate association, contracts; (2) the relaxed lower musculature could stretch or tear, but never pass upwards, during a pain; (3) the alleged dilatation of the cervix by the lower apex of the bag of water is inconsistent with the position of the os externum in primiparae at the end of the first stage and with the occurrence of normal dilatation after premature rupture of the membranes; (4) pressure from above or an elastic bladder filled with fluid, obstructed below would have a flattening effect; (5) the uterine contractions convert the ovoid uterus into a more cylindrical shape. (6) post-mortem rigidity, in which doubtless all muscular portions of the uterus play a part, causes widening of the cervical aperture and extrusion of the lower pole of the ovum; (7) after physiological expulsion of the ovum all parts of the musculature contract. After a summary of Stieve's and Goerttler's recent studies of the uterine muscle in pregnancy, with evidence of its fundamentally similar spiral structure in all parts, and after a critical review of Bandl's original publications, together with mathematical and mechanical considerations of his own developed at considerable length, Jacobs comes to the following conclusions: There is no functional difference between the lower and upper uterine segments. The spiral fasiculae of the wall-muscles gain in length during each pain by as much material as is gained from the cervical obturator. During the first stage the pains induce an alteration in the ovular form: its long axis is elongated, and in the upper part the radial diameters are diminished, while the lower part in consequence of straightening and increase of volume becomes dilated and therefore rounded. "This deformation renders possible a lasting shortening and concentration of wall-elements in the upper portion and it necessitates at the same time a lengthening of the lower section of the wall. The increase in length of the wall is brought about by the new formation, from the reserve material of the cervix, of an extension of the uterine tube.' Contraction of the wall of the lower segment is actively concerned in all these processes: it becomes more tense, harder, and wanders upwards, the cervical material following it. During the first stage, therefore, the wall of the uterus may be said to move upwards over the ovum. The amniotic fluid and its membrane are not essentially concerned in the process.

QUANTITATIVE HORMONE ESTIMATIONS IN CHORION-EPITHELIOMA AND HYDATIDIFORM MOLE.

This paper describes five cases of chorion-epithelioma. The first followed curetting for an abortion and was associated with very pronounced decidual formation in the uterus and the appearance within four months of ovaries which were the size of the fist and the site of multilocular lutein-cystic degeneration: the Zondek-Aschheim reaction, at first strongly positive, became negative, a month before death, after X-radiation of pulmonary metastases. In the second the hormonic reaction was strongly positive in

the presence of a vaginal chorion-epitheliomatous metastasis, with infiltration of the paracolpos and parametrium, two months after operation for extra-uterine pregnancy: cure was effected, with negative reaction, by excision of the vaginal tumour and X-radiation. In the third, vaginal metastases occurred nine months after molar pregnancy and cerebral and thoracic metastases were completely refractory to irradiation: the urine contained 10,000 to 30,000 mouse-units of antuitary hormone in the litre. In the fourth, cure was obtained by operative and X-ray therapy in a chorion-epithelioma with vaginal metastases following a spontaneous two months' abortion. Although intravascular nodules of chorionic tissue were found, the Zondek-Aschheim test gave a grade I reaction only seven days after operation and was negative seven days later. The fifth case was an example of intra-cervical chorion-epithelioma after digital removal of an abortion: the hormonic test became negative for a time, but death from metastases speedily followed. In a case of hydatidiform mole in the third month the urine a fortnight after the uterus had been emptied contained 12,500 mouse-units of antuitary hormone in the litre: curettage seven days later showed embryonic syncytial elements surrounded by fibrino-necrotic material embedded in decidual islets. Six weeks later a positive test (grade I) was obtained and large cystic ovarian tumours were present: chorionic cells with well-preserved tinctorial affinities were still present between the myometrial bundles, in curettings. The ovaries and uterus were removed: luteal cysts were found in the former, but metastases in neither. The cyst fluid contained 5,000 mouse-units of gonadotropic hormone in the litre. After this operation the Zondek-Aschheim reaction remained negative. It is concluded that the hormonic test is much more reliable than microscopical examination of curetted fragments in the search for persistent and active chorionic cells after hydatidiform mole or chorion-epithelioma. (The urinary examination in Ruzicska's cases, however, gave smaller amounts—not more than 30,000 to 50,000 mouse-units—of antuitary hormone than have generally been reported in such cases.) After normal pregnancy or abortion the Zondek-Aschheim reaction becomes negative in two to three weeks. After a hydatidiform mole it may be positive for four to six weeks: later a persistently positive test denotes retention of proliferative chorionic epithelium. It is strongly recommended that in the absence of all signs suspicious of pulmonary metastases energetic prophylactic irradiation of the thorax should be done after local treatment of chorion-epithelioma.

PRESENT-DAY KNOWLEDGE CONCERNING PROGNOSIS OF SPONTANEOUS DELIVERY AND OPERATIVE LABOUR IN FLAT PELVIS MEASURED BY X-RAYS.

Liepelt compares the curves constructed by Esch, which show the chances of spontaneous and operative delivery in various degrees of contraction of the conjugata vera as measured vaginally, with his own, in preparation of which the conjugate was measured radiologically by the lateral (transverse) photographic method of Guthmann. His measurements were found to be within two millimetres of those found by direct measurement in cases which came to abdominal section. In Liepelt's 219 cases the frequency of natural delivery was 15 to 20 per cent less than in those of Esch, although the test of labour was applied in a very large proportion

of the former: probably the selection of cases for radiographic measurement caused some basic difference in the material. Not until the conjugata vera reached or exceeded 8.5 centimetres did the probability of natural delivery exceed that of Caesarean section, yet conjugates of 7.5 to 8.5 centimetres were associated with 15 spontaneous deliveries against 45 Caesarean sections. It is conceded that the conjugate measurement has only a limited significance—as a fingerpost: the prognosis in flat pelvis is an art rather than a science.

W. E. Crowther.

REPORTS OF SOCIETIES

NORTH OF ENGLAND OBSTETRICAL AND GYNAECOLOGICAL SOCIETY.

DECEMBER.

The Society met at Leeds on Friday, December 13th, 1935, with the President, Mr. A. GOUGH, of Leeds, in the Chair.

The President delivered his Presidential Address on

OVARIOTOMY.

He said that when he looked round on the members of the Society, he saw a heterogenous collection of people who had been led by inclination or opportunity to enter the same domain of practice. This was partly explained by the different modes of entry into their speciality. In the past, some have adopted it as a branch of general surgery, some have been primarily obstetricians, some have started as pathologists, and so on. Nowadays there is a more definite path, although a rather long one, to be followed by those who aspire to a career as an obstetrician and gynaecologist. In the future they may expect to see a greater uniformity in their camps, and he was not sure that this would be an unmixed blessing.

It was certain, however, that there would always be intellectual attractions of many kinds, which will continue to appeal to different types of people.

They had to deal with clinical problems of absorbing interest. There was no department of medicine in which the psychological factors were more important; though often nebulous, they yet repaid a careful study. He could not recall any contribution to this Society on a psychological subject, and he offered this as a suggestion for a future presidential address. Gynaecological pathology was a very special subject, and there were many problems still awaiting solution.

For himself, he said that the technique of operative work had always made a special appeal. At the lowest estimate it was a handicraft which satisfied their desires to make something and to see some improvement as the result of their efforts. In the higher flights of operative work there was scope for the exercise of artistic talent somewhat akin to that of the sculptor, although the surgeon had to work in a more difficult medium.

All these motives, and others, may be combined in various proportions, and there need be no incompatibility between them.

After turning over in his mind several more difficult subjects, the President said that he decided to devote his remarks to ovariotomy, and chiefly to the operative technique. This may appear to be simple and an ordinary subject, but he thought it worth while to revise their ideas on the

commonest operations. When attending meetings and visiting other clinics, he had always been better pleased to improve his knowledge and technique of some common subject than to learn about some rarity which he might never meet.

Preliminary considerations. The President stated that he would say little about the pathology or clinical features, but there were two points which must always be borne in mind before undertaking an ovariotomy. He referred to the possibility of both ovaries being diseased and the possibility of malignancy. It was as well to safeguard himself by mentioning these to the friends if not to the patient herself.

Bilateral tumours are often unexpectedly found. For example, there may be a large cyst of one ovary which attracted all the attention, and a small cyst of the other one. In some cases it may be necessary to remove both ovaries, and this was a very serious matter for a patient in the period of active sexual life. In such a case an effort should be made to preserve at least a portion of an ovary. He recalled a case of bilateral ovarian dermoids in which he was able to leave a third of one ovary: after a period of infrequent menstruation the normal monthly rhythm was re-established.

The President found in his records of ovariotomies that approximately one in seven was classed as malignant. This figure was misleading in two ways. In the first place, there had been many cases of ovarian carcinoma in which removal was found to be impossible, and they were recorded as laparotomies. On the other hand, it was certain that some cases have been wrongly considered to be carcinomata when they were actually tumours of a non-malignant kind. Here he cited the case of an ovarian tumour the size of a full-time pregnancy. It was removed, and histological examination showed what appeared to be a solid carcinoma. The worst prognosis was given, but the patient has remained well after four years. In the light of subsequent events he thought it was clear that this must have been a granulosa-cell tumour and not a carcinoma.

What were the features of an ovarian growth which were suggestive of malignancy? Solid tumours were more likely than cystic tumours to be malignant, but to this rule there were many exceptions both ways. Here he remarked, in passing, that ovarian carcinomata often resembled myomata of the uterus, and if a tumour was found which was like an atypical myoma, the thought should at once occur that it may be a malignant ovarian growth. Satellite nodules in the pouch of Douglas or disseminated throughout the abdomen may be malignant, but they may be the result of simple papillomatous tumours. Ascites is usually present in malignant cases, but it also occurs in connexion with innocent conditions, such as ruptured cysts and fibromata. Pain may be a prominent feature with infiltrating growths, but it also occurs in cases of simple cysts which have undergone some secondary change, such as inflammation, suppuration or torsion. The presence of cachexia is not conclusive, because large ovarian cysts merely by their mechanical hampering of the digestive functions can cause extreme cachexia.

It is necessary to remember that ovarian carcinoma is often secondary to a primary growth in the stomach, colon or breast. The primary growth may not have caused any noticeable symptoms, but a careful examination should be directed to those regions, supplemented in doubtful cases by radiological investigation and by tests for occult blood in the stools.

But hardly ever can an absolutely certain diagnosis be made without an exploratory incision. In many cases nothing can be done, but now and then the condition proves unexpectedly favourable. One is always sorry to have subjected the patient to the discomfort and disappointment of a futile operation, but it would be far more regrettable to leave a curable condition unrelieved.

The operation. The President referred to a few practical details in connexion with the operation of ovariotomy.

It was very seldom indeed that the patient was judged unfit to bear the operation. He had only twice decided that the radical treament was impracticable on account of extreme age and feebleness. If there was any serious systemic disease, a short delay might be made to get the patient into a safer condition. In cases of enormous cysts, the removal of which might result in dangerous or even fatal shock, preliminary tapping is advisable.

Removal by the vaginal route need hardly ever be considered. The President had done this only three times. They were cases of small cysts, accidentally discovered in the course of a vaginal operation. In suitable cases it was a simple little operation. The pouch of Douglas was opened through the posterior fornix. An examination was made with two fingers to find if the cyst was sufficiently mobile. An assistant then presses it down to the bottom of the pelvis. After making certain that it is the cyst and nothing else, it is seized with toothed forceps and punctured. The collapsed cyst can then be drawn into the vagina and its pedicle tied.

The abdominal route is the only one to be thought of in most cases. With regard to the incision, the President was strongly in favour of the paramedian as opposed to the median. These patients often have a thin overstretched abdominal wall, with degenerative musculature, and there is a danger of the wound's bursting open. He thought it was as well to spend a little extra time in making the incision and closing it, so as to obtain the strongest possible suture line.

Then there was the question of whether to tap the cyst before removal or not. He removed cysts wholly if they did not exceed the size of a six months' pregnancy; but above that size, if the cyst appeared to be innocent, he usually tapped. Of course, in some cases, tapping was impossible. There might be many small loculi, the contents might be too viscid to run through the canula, or it might be a solid tumour: then the incision had to be extended, but he did not think that increased the danger of the operation in a feeble old woman with a large tumour. He was aware of the arguments advanced against tapping, the most weighty being the possibility of peritoneal dissemination from a malignant tumour, but so far he had never had cause to regret doing it.

If there were adhesions, it is as well to separate them, from the intestines at least, before emptying the cyst. On the other hand, the lower pole might be inaccessible until the bulk had been reduced by tapping.

In dealing with the pedicle it is important to use reliable clamps which do not slip. The pedicle should be taken in small segments; there is no reason why three, four, six, or eight clamps should not be applied. The ligatures are of No. 3 catgut and are tied with a triple knot. The speaker had never had a slipped ligature, although he did not transfix the pedicle. The objection to transfixation is that it is impossible always to avoid damaging a

vein, or even an artery, with the result that a large spreading haematoma formed, and this is a troublesome accident.

When possible he liked to cover the stump with peritoneum. This might sometimes be done by overstitching; sometimes the stump might be tucked into a kind of sub-peritoneal pocket made in the broad ligament. Sometimes it might be impossible to cover it, and he thought that this was less important on the left side, because the stump slipped behind the pelvic colon, where it is not likely to contract any troublesome adhesions.

After the cyst or tumour has been removed, the second ovary must be examined. The indications for removal of the second ovary are (1) bilateral ovarian tumours, (2) malignant tumours, and (3) patients past the menopause. But in a case of bilateral cysts in a woman in the period of active sexual life, some portion of an ovary should be preserved if possible. In women past the menopause it was the speaker's invariable practice to remove the second ovary on account of the risk of tumour-formation at a later date. The chance of this has been placed as high as 15 per cent. He thought this estimate too high, for he could only recall four cases; one of them was very tragic. It was one of his early ovariotomies in a woman 50 years of age. He removed a simple cyst and left the other ovary. Eight years later she came back with a tumour in the remaining ovary, and this time it was a carcinoma, of which she died.

Another was the oldest patient in his series, a woman 80 years old. She had had an ovariotomy performed more than 40 years previously by Sir Arthur Mayo Robson. After that interval she had another simple ovarian cyst, which the speaker successfully removed.

He did not ordinarily remove the uterus even when both ovaries had gone, for he thought it increased the severity of the operation. In malignant cases, of course, the uterus should be removed if it was hoped to effect a radical cure. In some cases, especially of low broad ligament cysts, hysterectomy might be necessary to gain adequate access to the lower part of the cyst. It was, naturally, done if there was sufficient indication in the uterus itself, such as the presence of myomata or post-menopausal haemorrhage.

Parovarian cysts were rather peculiar. In favourable cases the peritoneum was incised either in front of or behind the Fallopian tube, and the cyst enucleated, leaving the Fallopian tube and ovary. When the Fallopian tube is greatly stretched and the ovary flattened out, the whole appendage may need to be removed along with the cyst, while in difficult cases it might be necessary to sacrifice the uterus.

The President had never yet met a non-malignant case in which he found it impossible to remove the cyst, but that is not to say that he shall never have that misfortune. He knew that some were densely adherent so that only a partial removal and marsupialization of the rest might be possible.

Torsion of the pedicle. In the speaker's experience this did not often cause catastrophic symptoms—usually only a moderate amount of pain and malaise. In removing cysts with twisted pedicles he thought that it was important to undo the twist before ligaturing the pedicle. It was tempting, on seeing a cord-like twisted stalk, to ligature it forthwith, but after the cyst had been removed the pedicle was sure to untwist and the ligature would be

displaced. He usually left a drainage tube, which was removed in two to three days if there was no discharge and the temperature was favourable.

Suppurating cysts cause severe pain with high temperature and a rapidly deteriorating general state. The cyst is removed, and generous provision made for draining the peritoneal cavity by one or more tubes. One of the speaker's patients had an apparently generalized peritonitis, but after a critical illness she recovered.

He had seen only two cases of ovarian cyst associated with pregnancy. One was a cyst the size of a grape-fruit which was discovered low down in the pelvis at about the sixth month. It was decided to wait until term before interfering. She arrived in hospital with the head on the perineum, and the delivery was not obstructed. The cyst, a dermoid, was removed a fortnight later. In the second case a multilocular cyst was found co-existing with a three months' pregnancy. Ovariotomy was performed and the pregnancy went to term.

In dealing with malignant cases it was necessary to steer a proper course between rashness on the one hand and timidity on the other. An incision should be made just large enough to admit a hand, so that the exact state of affairs inside the abdomen can be determined. If there are widespread secondary deposits, or if the intestines are extensively involved, there is nothing to be done except to remove a fragment of tissue for histology and stitch up the wound. In doubtful cases the tumour should be removed, for it is impossible to be sure whether it is innocent or malignant. The ideal is to remove both appendages together with the uterus, but this cannot always be done. If the removal is once started, it must be completed, for the abandonment of an operation in the middle on account of technical difficulties is almost certainly fatal. In malignant cases the speaker left the sutures in position for three weeks, since the rate of healing is much reduced. Whether the operation has been apparently successful or not a course of deep X-ray treatment should be given.

STATISTICS.

Results in a series of 180 *ovariotomies.*

	Cases	Deaths
Vaginal ovariotmy	3	0
Abdominal ovariotomy (simple)	123	3
Abdominal ovariotomy (ruptured)	6	0
Abdominal ovariotomy (twisted)	16	0
Abdominal ovariotomy (suppurating) ...	7	0
Abdominal ovariotomy (malignant) ...	25	1
TOTAL	180	4

The speaker showed a series of 180 ovariotomies. Comparing the two chief gynaecological operations, he found that even now, when so many cases which would formerly have been hysterectomies were treated with radium, he still did approximately four hysterectomies for every ovariotomy. He had

included tumours and cysts of new formation, but had not included cases of malignant disease in which the operation of ovariotomy was contemplated but found impracticable. A death from any cause within 30 days is entered as a post-operative fatality. It was remarkable that the table showed a clean bill in the presence of acute complications.

The speaker's figures may be compared with some collected from the recent literature:—

Ovariotomies.

	Cases	Deaths
Spencer	658	35
Munro Kerr	250	11
Donald	252	5
Bride	100	5
Whitehouse	200	10
Green-Armytage	547	41
Chelsea Hospital for Women (combined statistics for 30 years)	1659	53

It will be seen that no one could show a better mortality-rate than two per cent, while most were in the region of three to five per cent. In Green-Armytage's series allowances must be made for the special conditions of practice in India, where many advanced and neglected cases had to be treated.

The President briefly described his four fatal cases.

Case 1. Mrs. A. S., aged 67 years. Carcinoma of ovary. After the operation the progress was at first favourable. Then the condition steadily declined, and death occurred on the twenty-eighth day. At the post-mortem examination extensive deposits of carcinoma were found in the thorax, which had never been suspected.

Case 2. Mrs. K. A., aged 58 years. Large bilateral cysts with ascites and oedema of the legs. This patient became maniacal, and died on the fourth day. He did not know the reason for the post-operative mania. She may have been an alcoholic subject.

Case 3. Mrs. A. G., aged 31 years. Simple cyst the size of a coconut. The operation was of the simplest character and the progress uneventful until the twelfth day, when she suddenly died from pulmonary embolism.

Case 4. Mrs. E. A., aged 65 years. Large multilocular cyst. After the operation intestinal paresis occurred. Enterostomy was done, but death occurred on the fourteenth day. This was a very unwilling patient, and she needed to be persuaded and over-persuaded by the speaker, her family doctor, and her relatives before she would consent to the operation. He could not help thinking that her unfavourable mental attitude may have been responsible for the disturbance of her intestinal functions.

Conclusion. The President said that it may appear to some that he had dealt with details of little importance. He was aware that he had said nothing that was not familiar to the more experienced members, although

their views may not coincide with his, but he hoped that the younger ones may have gleaned something of value to them.

And, finally, he recalled the words of Michelangelo, "Trifles make perfection, and perfection is no trifle."

Professor MILES H. PHILLIPS, of Sheffield, showed a specimen of

SARCOMA OF THE ISTHMUS UTERI.

The specimen consisted of a uterus with its appendages, which, besides several small subserous fibroids and one large interstitial fibroid (3½ × 3½ × 3 inches), had borne a pedunculated friable brain-like tumour. This friable tumour, as large as the surgeon's fist, had distended the cervical canal and upper part of the vagina. It was removed piecemeal immediately before the panhysterectomy. It was found that the base of the pedicle arose from almost the whole circumference of the internal os and the adjacent three-quarters of the corpus—that area described by Professor Oskar Frankl as the isthmus uteri. It did not involve the capsule of or the interstitial myoma.

Microscopically, it was a sarcoma with strikingly hetermorphic cells and nuclei, with a marked tendency to a spindle-cell type.

The patient, E. C., was a spinster of 55 years, who had been losing almost continuously for 13 months after 10 months of amenorrhoea. The periods during the previous four years had been excessive. There had been no pain; only a sense of heaviness.

After operation 20 exposures of deep X-rays were given to her abdomen in October 1934.

Twelve months later the patient was in good health, free from any symptoms, and there were not any signs of recurrence.

Dr. J. W. BRIDE, of Manchester, reported further on

A SPECIMEN OF VESICAL CALCULUS,

and showed the stone cut open. There was nothing in its centre.

Mr. D. W. CURRIE, of Leeds, read a communication on

THE ADMINISTRATION OF VITAMINS IN CASES OF HABITUAL ABORTION.

Mr. Currie said that the tendency for a woman to abort during succeeding pregnancies is a most distressing condition, both to herself and to her medical attendant. Many general and local diseases have been blamed, but the treatment has rarely led to a cure. True it is that the more abortions a patient has, the nearer she will get to a full-time pregnancy; because of this fact results have been obtained with all manner of treatments, and yet the speaker ventured to think that so far none of them have been entirely satisfactory. Syphilis has long been blamed for repeated abortions, and antisyphilitic treatment is advised. During the past five years of Mr. Currie's stay at the Leeds Maternity Hospital he could not recall a single case of repeated abortion with a positive Wassermann reaction, and in the series of

cases which he was now presenting he said that all the blood tests were negative.

During the past few years the importance of the vitamins in the maintenance of a growing embryo has been demonstrated. Especial significance has been given to the action of vitamin E. It was inconceivable that in the general diet of to-day there could be a complete absence of any one of the vitamins, yet it is possible that during pregnancy, when metabolism undergoes such drastic changes, more vitamins are necessary, and that a deficiency in one or all of them leads to such morbid conditions as habitual abortion, albuminuria, and neuritis.

Experiments with animals have shown that the presence of vitamin E is essential for the continuance of pregnancy to a successful term. Vitamin E is found at a fairly high concentration in the oil obtained from the germ or embryo of whole grain.

P. Vogt-Möller,* of Copenhagen, has collected 20 cases of habitual abortion treated by the administration of wheat germ oil. The results obtained were favourable; 17 of the 20 women gave birth to living children at term. Habitual abortion is not an uncommon condition, but some months must elapse before a sufficient number of cases can be collected to make a fair estimate of the results of treatment. During the past two years, through the courtesy of Glaxo Laboratories, the speaker had been given an unlimited supply of wheat germ oil. The oil is supplied in capsules containing three minims, and the dose consists of one capsule daily, taken by the mouth, from the day of the first attendance until the onset of labour. At first only vitamin E (i.e. wheat germ oil) was given, but later vitamin A and vitamin D have been added by giving either adexolin or calcium gluconate and calciferol.

In this series each patient was tested for the presence of a general disease, uterine displacement, or torn cervix. Thirty patients have been treated; of these 21 were delivered at term; the other nine were all past the sixth month of pregnancy at the time of delivery. The average length of time that the treatment has lasted has been five months. Twenty living children have been delivered. One of these died from a structural deformity of the throat. There was only one case of abortion. The 21 delivered mothers had had, collectively, 59 pregnancies resulting in only five living children; but with the administration of vitamins in their most recent pregnancies, 20 living children were delivered. These figures do not need further support. Tables of the cases were shown.

Mr. P. Malpas, of Liverpool, read a note on

Corporeal Recurrence of Carcinoma Cervicis after Radium Therapy and the Scope of Hysterectomy in its Treatment.

Mr. Malpas said that corporeal recurrence of carcinoma cervicis after radium therapy was not a common condition if those cases in which the involvement of the body is but one part of a general pelvic cellular recurrence

* Vogt-Möller, P. *Acta Obstetrica et Gynecologica Scandinavia* (Helsingfors), 1933.

are excluded. Such a proviso will exclude most cases of recurrent or persistent involvement of the body of the uterus with an advanced primary growth which had led to complete fixation of the uterus. By a similar argument it will be seen that the cases in which the body of the uterus is the sole site of recurrence will be those in which the disease was relatively early at the time of the first radium treatment.

These cases, though few in number, gain in importance from the fact that they represent the type of recurrence most amenable to further treatment, and furthermore that such a recurrence does form a secondary focus for dissemination of the growth.

In a series of 359 cases of cervical carcinoma treated with radium there have been five cases in which the combination of a secondary enlargement of the uterus and the absence of gross cellular pelvic infiltration justified the performance of a secondary hysterectomy. All the cases were originally growths in Stage I or Stage II. Three of the cases were adenocarcinomata, indicating that the slower growth and relatively greater resistance of this type of growth to radiation favour the development of a recurrence of this type.

The syndrome produced by the condition would appear to be the late onset of irregular lower abdominal and lumbar pain, indicative of uterine and renal distension, the return of a watery discharge, the presence of an enlarged and globular uterus, and radiological evidence of ureteral obstruction.

Mr. St. George Wilson described a similar case before the Society in 1934. His specimen of a uterus removed by hysterectomy showed the cavity distended by thin pus and lined by an active squamous epithelium disposed in many layers, although as far as the speaker could make out he considered the lesion to be innocent. The whole problem of corporeal recurrence was closely bound up with the question of post-irradiation pyometra, and was discussed, among others, by Hirsch, Jeanneney, and Schlick.

In two of the five cases under discussion the growth at operation was found to have extended into the upper half of the broad ligament, and a satisfactory operation, so far as complete removal of the invaded uterus was concerned, proved impossible. Both cases were originally Stage II squamous carcinomata, the interval of freedom from symptoms after the original radium treatment being 16 and 17 months respectively.

One of these patients died of uraemia four days after operation. The second patient was freed from pain for nine months and then died suddenly in what was described by her doctor as uraemic coma.

The remaining three cases were all columnar-cell carcinomata of the cervix, one being originally a Stage I growth, the other two Stage II.

Excretion pyelography was performed in two of the cases, and showed the presence of a definite obstruction of the right ureter at the pelvic brim.

In the first case (Mrs. McE.) the uterus was found massively infiltrated by growth—microscopically an adenocarcinoma. This patient remained free from symptoms for a further five months, returning to her work, but then developed a rapidly growing recurrence in the iliac fossae and abdominal wall. The terminal growth was a much more rapidly growing lesion than the primary tumour, probably due to the removal of the dense fibrous capsule formed around the growth by the interaction between the carcinoma, tissues, and radium. A section taken from an uninvolved area of the uterus well shows this dense fibrous capsule.

In the second case the uterus, of which a photograph was shown, was distended by a thin purulent fluid and showed no microscopic evidence of growth. Sections of the wall, however, show it to be lined by a thin layer of malignant columnar epithelium, well shown in the microphotograph. Excretion pyelography done on the eleventh day after operation showed a complete disappearance of the dilatation of the urinary tract noted a day before operation. The patient made a good recovery and remained in perfect health for 14 months, but then developed symptoms indicative of a rapidly extending malignant involvement of the colon, from which she died 20 months after the operation. X-ray examination repeated two months before death revealed no return of the ureteral obstruction.

The third patient (Mrs. H.) is still alive and well two years after the operation and five and a half years after the original radium treatment.

Touching on the question of post-irradiation ureteral obstruction, it is evident that in the cases under discussion the pressure was mechanical, due to the lateral pressure of a distending uterus firmly anchored at its lower pole. While ureteral obstruction is one of the commonest late complications, its development can almost invariably be attributed to a pelvic recurrence, usually a diffuse cellular recurrence, but in a small proportion of cases to a corporeal recurrence, in which event pressure outside the ureteral wall is responsible for the obstuction. The question is well discussed by Drexler and Howes. Stenosis directly attributable to radium must be very rare.

As regards prophylaxis, the fact that in all the three cases of adeno-carcinoma the uterus measured four inches or more in length at the time of the primary treatment emphasized the need to ensure that the whole cavity is effectively irradiated at the time of the initial treatment, this in turn depending upon the insertion of an intra-uterine applicator of adequate length.

One may conclude that hysterectomy has a distinct place in the treatment of these cases but carries the risk of provoking a rapid recurrence, even though in unsuccessful cases its palliative effect may be good. Hysterectomy should not be performed in cases in which there is any likelihood of recurrent or persistent malignant invasion of the vaginal vault.

Unless it is done immediately after the radium therapy—a line of action which does not commend itself to most workers—hysterectomy has no place in the secondary treatment of carcinoma cervicis until at least 12 months have elapsed. Heymann's dictum in 1929, that the routine treatment of local recurrence after radiation is panhysterectomy, still seems valid.

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FEBRUARY.

A meeting of the North of England Obstetrical and Gynaecological Society was held in Sheffield on Friday, February 28th, 1936, with the President, Dr. RUTH NICHOLSON, in the chair.

Dr. J. W. BRIDE reported

A CASE OF RECURRING ECTOPIC PREGNANCY, AND AN UNUSUAL CASE OF ECTOPIC PREGNANCY.

He had operated on the first patient, pregnant for the second time, for a left tubal mole, and had performed left salpingo-oöphorectomy. In 1934 she had a normal delivery, and nine months later an ectopic pregnancy occurred on the right side. This was treated conservatively by tubal resection. The patient had been twice married. The special points of interest were:—

(*a*) A normal pregnancy by her first husband. A left ectopic pregnancy by her second husband 13 years later. A normal pregnancy two and a half years after the ectopic pregnancy. An ectopic pregnancy nine months after the second normal pregnancy.

(*b*) At the operation on the first ectopic pregnancy, which was on the left side, the right appendages were found to be normal, which would appear to be confirmed by the subsequent normal pregnancy.

(*c*) There was not any disease of the appendix.

(*d*) There was not any history suggestive of gonorrhoeal infection or sign of such infection at operation.

(*e*) The puerperium in each pregnancy had been uneventful.

The second case was one of ectopic pregnancy occurring within 20 weeks of a confinement. A large mass was present which extended to the umbilicus, and a temperature of 102°F. and a pulse-rate of 140 tended to confuse the diagnosis. Laparotomy revealed a large haematocele with a ruptured left Fallopian tube, which was removed. Convalescence was uninterrupted.

The PRESIDENT recalled a case of recurrent ectopic pregnancy. She expressed the opinion that resection of the Fallopian tube was not without danger.

Professor MILES PHILLIPS thought it better to use the term "recurrent" or "recurring" for those cases of tubal pregnancy occurring in a Fallopian tube which had been repaired at a previous operation after incision into its wall to remove a tubal mole. The term "repeated" was in general use for cases of pregnancy occurring in the opposite Fallopian tube after a previous operation, generally excision, for a tubal pregnancy. He referred to a case of recurrent tubal pregnancy which occurred in a conserved Fallopian tube after an interval of 16 months, and which necessitated salpingectomy. He also recalled F. W. Ramsay's well-known case of successful uterine pregnancy following two operations for repeated tubal pregnancy, in the first of which a Fallopian tube had been removed and in the second conserved. On the other hand, Aleck Bourne had recorded fatal rupture of a recurrent pregnancy in a conserved Fallopian tube.

Mr. C. H. WALSH stated that he had the records of 80 ectopic pregnancies, 43 of which were on the right side and 37 on the left. Half were tubal abortions and half were tubal ruptures. Slightly over 50 per cent were multiparae, slightly over 50 per cent were presumed congenital defects of the Fallopian tube, and slightly less than 50 per cent presumed old infection. Five of the 80 were recurrent, four in the opposite Fallopian tube, and one in the stump after partial salpingectomy. There were not any immediate deaths in the series, but one patient died three years later from intestinal obstruction.

Dr. Bride, in reply, agreed with Professor Miles Phillips's suggestions regarding terminology. He stated that his patient was most anxious to become pregnant again. He hoped that if this did happen a cornual pregnancy would not be the result.

Dr. CLANCY reported

A CASE OF NAEGELE'S PELVIS, IN A SIXTH PREGNANCY.

The patient had had two stillbirths and three live children, all instrumental deliveries. After the first delivery there had been paralysis of the left leg.

She was admitted to hospital at the thirtieth week, and on vaginal examination the membranes were found to have ruptured. The cervix and vaginal vault exhibited marked laceration, indicating severe trauma at previous deliveries, and in view of this fact it was decided to have an X-ray photograph taken. This revealed a Naegele's pelvis, of which there had been no indication by vaginal or other examination.

The external appearance of the patient was normal; neither figure, gait, nor carriage gave any suggestion of deformity. The following measurements were taken: interspinous, 8¼ inches; intercristal, 9½ inches; external conjugate, 6¼ inches; external obliques, 7 and 7½ inches; posterior superior spine to symphysis on each side, 6¾ inches; spine of last lumbar vertebra to anterior superior spine, 6½ inches and 6¾ inches.

On examination of the patient's back there was a definite bony lump over the region of the sacro-iliac joint on the affected side. Dr. Clancy considered the striking feature of these cases to be the difficulty in diagnosis, as apart from the bony lump there was nothing to indicate the serious deformity which was present. The customary measurements, as stated by Whitridge Williams, merely suggest a justo-minor pelvis. Dr. Clancy felt that there was obviously much to be said for having an X-ray photograph taken in all cases in which there was a history of former dystocia.

Discussion. The PRESIDENT referred to the rarity of spontaneous delivery in this type of case, also to the high mortality recorded. Litzmann found 22 deaths in 28 cases.

Dr. BRIDE referred to the temporary paralysis of the leg from which the patient had suffered after the first delivery. He considered it to be a striking point that injury to nerves is so rare even after difficult instrumentation.

Professor MILES PHILLIPS expressed the opinion that Dr. Clancy's case showed the desirability of all maternity hospitals being provided with an X-ray apparatus.

Mr. C. R. MACDONALD showed

A SPECIMEN OF ACUTE TORSION OF A HYDROSALPINX IN PREGNANCY.

The patient was a nullipara who had complained of a dull aching pain in the right of the lower abdomen on and off for two years. On admission she gave a history of nine weeks of amenorrhoea. She had experienced four attacks of colicky pain during the three days before admission, and had complained of vomiting. On admission the temperature and pulse-rate were normal, and the only objective signs abdominally were a little tenderness and rigidity in the right iliac fossa. On inspection of the cervix, pouting of the mucosa was noted and on bimanual examination a fixed, tender, elastic mass about the size of a large grape-fruit was found in the pouch of Douglas, slightly to the right of the midline. The cervix lay anteriorly and the body of the uterus could not be defined apart from the mass. A general anaesthetic was given and two swellings were now apparent, one a retroverted gravid uterus and the other seemingly a right-sided ovarian cyst. Laparotomy revealed a uterine pregnancy of about 10 weeks' duration, and a right hydrosalpinx, which with the right ovary had undergone torsion through one and a half circles. The right ovary and right Fallopian tube were removed and convalescence was uninterrupted. The specimen showed a hydrosalpinx about the size of a tennis ball.

In the discussion which followed, Professor DOUGAL and Professor MILES PHILLIPS were inclined to consider the specimen a twisted fimbrial cyst.

Mr. C. H. WALSH showed

A SPECIMEN OF CALCIFIED FIBROIDS COINCIDENT WITH A MALIGNANT PSEUDOMUCINOUS OVARIAN CYST AND ADENOCARCINOMA OF THE BODY OF THE UTERUS WITH HAEMATOMETRA.

The patient was a nulliparous spinster of 66 years who had passed the menopause at 52, since when there had been no vaginal discharge. She had been well until the day before she was admitted to hospital on account of severe abdominal pain and vomiting. The pulse-rate, respiration-rate, and temperature were normal, but abdominal palpation revealed a hard mass in the right iliac fossa and a cystic tumour in the left side of the abdomen. The cervix felt normal and there was not any vaginal discharge. On a possible diagnosis of carcinoma of the colon, a barium meal was given. On radiological examination a calcified mass was seen in the right iliac fossa, which had the appearance of a calcified fibroid. The cystic mass was thought to be ovarian in origin, and laparotomy was performed. There was not any ascites. The uterus contained multiple fibroids, and the large calcified tumour was found to be a pedunculated fibroid, arising from the right side of the fundus uteri. The swelling on the left side was an ovarian cyst the size of a football. Total hysterectomy with bilateral salpingo-oöphorectomy was performed, and on incising the uterus after operation the surgeon was surprised to find it full of malignant growth and distended by about six ounces of blood-stained fluid. The Fallopian tubes were also found to contain several malignant nodules, but in no instance had the growth

reached the peritoneal surface. The ovarian tumour proved to be a papillary pseudomucinous cystic adenocarcinoma.

In the discussion which followed, Professor FLETCHER SHAW, in advocating removal of the uterus in all cases of malignant disease of the ovaries, recalled a case which he had described to this Society many years before and which supported the view that the growth in the uterus was secondary to the one in the ovaries.

This woman, who was 39 years of age, had double ovarian carcinomata, each the size of an orange and free from adhesions. These were removed and the uterus retained.

Following the operation the patient had amenorrhoea for 18 months, succeeded by irregular and increasing bleeding. About two years after the first operation, the irregular haemorrhage having been present for about six months, panhysterectomy was performed, and an advanced carcinoma was found in the interior of the uterus.

If the growth was primarily in the uterus it is hardly possible for it to have remained quiescent and for the woman to have had 18 months' amenorrhoea after the removal of the ovaries. If, as seems more likely, the uterine growth was secondary to the ovarian, it must have been in an early stage when the ovarian growths were removed, and progressed slowly as haemorrhage commenced only 18 months later.

The first operation was in 1912 and the second in 1914, and the patient is alive now, 24 years after the first operation.

Dr. ELLIS considered it an advantage when operating in these cases to leave the uterus with a view to subsequent radium therapy. He quoted a recent paper by Schröder giving results of treatment of a relatively large number of cases of proved malignant disease of the ovary treated by radiation.

Schröder divided his cases into three groups. The first group consisted of cases in which he was able to remove all visible growth. The second group consisted of cases in which most of the visible growth was removed. The third group consisted of cases in which only a portion of the growth was removed for biopsy.

The five-year cures in group 1 equalled 66 per cent; the five-year survivals in group 2 equalled 16 per cent. Group 2 was, however, sub-divided into two sub-groups. The first of these, in which the uterus was not removed so that it was used afterwards for the intra-pelvic application of radium in addition to the X-ray treatment which all patients received, showed a five-year survival-rate of 25 per cent; while in the second group, in which the uterus was not left and, therefore, radium not applied, the five-year survival-rate was zero. In the third group, in which the uterus was of necessity left, the five-year survival-rate was nine per cent. These figures indicate the advisability of supplementing the operation by radium as well as X-ray treatment with the corollary that it is advisable to leave the uterus in position if all obvious growth be removed.

Mr. BURNS referred to a case in which a malignant ovarian tumour, the size of an orange, was removed, and the patient had no symptoms for two years. After this time uterine haemorrhage occurred, and, on curetting, malignancy similar in picture to that of the ovary was found. A dose of 2,000 milligram-hours of radium was given, and the patient had no further

symptoms. A curettage carried out one and a half years later revealed fibrous tissue.

Professor FLETCHER SHAW and Professor DANIEL DOUGAL read a paper on

THE RESULTS OF RADIUM TREATMENT OF CARCINOMA OF THE CERVIX UTERI.

Although radium has been used in this country for many years for the treatment of carcinoma of the cervix, it is a curious fact that, until recently, no statistical reports for a five-year period have been published; and even now the figures from individual institutions are very small, with the exception of those from the Marie-Curie Hospital. True, the staffs of the different institutions where radium treatment was being carried out stated that they were obtaining good results, but they did not publish any figures comparable with those emanating from foreign clinics.

On the other hand, the gynaecologist who performed the Wertheim operation knew quite well what percentage of cures he was able to obtain and was, therefore, able accurately to assess the value of that method of treatment. Unfortunately, the Wertheim operation is associated with a high immediate mortality and a long and trying convalescence. For these reasons most operators would have been prepared to abandon the method if convincing evidence had been produced by our radiological colleagues that radium treatment was able to yield results at least equally good. Such evidence, however, was not forthcoming, and it was this inability to obtain definite figures from the use of radium in this country which determined us in 1928 to purchase our own supply and to treat our own cases, both in private practice and in hospital. As this step was in the nature of an experiment, we decided to employ one particular method, carefully to record and follow up every case, and to publish our results as soon as a sufficient number of cases treated more than five years previously had been collected.

After much thought and comparison of foreign results we decided to follow the method used by Heyman in Stockholm, but with certain modifications suggested to us by Dr. Helen Chambers and Dr. S. Russ of the Middlesex Hospital. On their recommendation we obtained 100 milligrams of radium element, made up in such a form that 40 milligrams could be inserted into the uterine cavity and 60 milligrams applied to the vaginal aspect of the cervix and vaginal fornices. The 40 milligrams were packed into two large platinum needles with walls one millimetre in thickness and containing 24 and 16 milligrams respectively, the 60 milligrams into 15 small platinum needles with walls 0.5 millimetre in thickness and each containing four milligrams of radium. To obtain the additional screenage necessary, the small needles were enclosed in three box applicators made of silver and with walls 1.6 millimetres in thickness.

We decided to apply the radium to the surface of the cervix rather than to insert the needles into the growth, as we found that there was a considerable mortality in certain institutions where the latter method was used, probably due to the inoculation of organisms into the subjacent healthy tissue. Each patient was treated on three occasions for 24 hours, there being an interval of one week between the first and second treatments, and of three weeks between the second and third. The total dosage was, therefore, 7,200

milligram-hours, larger than that now used by Heyman, but we decided to adhere to this dose until we had some facts before us.

We still performed the Wertheim operation upon selected cases, but less and less frequently as we became convinced of the good results obtained with radium, and now we have both practically abandoned this operation.

In 1930, largely as a result of our experiment, the Board of Management of the St. Mary's Hospitals, Manchester, decided to purchase 220 milligrams of radium, sufficient for the treatment of two cases daily, so before long it will be possible to publish the results of a much larger series of cases treated by the staff of that hospital.

Results.

We have treated 94 cases prior to January 1st, 1931, and of these there were 39, or 41.4 per cent, alive and well five years later, and 55, or 58.6 per cent, dead or untraced. Included in the survivals is one patient who was well at the end of five years but died from recurrence 18 months later. Another patient had a recurrence 4 years and 10 months after treatment, but was alive at the end of the five-years period; she has been included in the fatalities. Four patients cannot be traced and they also have been included amongst the deaths.

Immediate Mortality.

One patient died from peritonitis after the second treatment and another from pulmonary embolism, so the immediate mortality is 2.1 per cent, a very low figure compared with the mortality following the Wertheim operation.

Microscopical Confirmation.

At first this was not carried out in the advanced cases, as the diagnosis in these circumstances is so definite to an experienced clinician that such confirmation appeared unnecessary. Later, when we realized that readers of our results would not have seen the cases, and that acceptance of the diagnosis must rest on our unconfirmed statement, we excised a piece of the growth for laboratory confirmation as a routine measure. Microscopic examination was, therefore, only carried out in about half of our cases, but those not so examined were so advanced that no error in diagnosis was possible.

Stage of Growth.

No matter how carefully the various stages of carcinoma of the cervix are described, the stage into which a particular case falls will always depend on the personal opinion of the operator, and for this reason it is impossible to compare the results obtained by different operators in any one group. This makes comparison between the results of Wertheim's hysterectomy and radium extremely difficult, as the radiologist tends to classify a larger number in the inoperable group than does the surgeon.

As an illustration of this difficulty in classification, Gray Ward records in his last publication how three experienced visiting clinicians examined one case at the Radium Hemmet and each classified it into a different stage. We have adopted the classification of the Radiological Sub-committee of the League of Nations Cancer Committee and grouped our cases as follows:

First stage: 11 cases; seven alive and four dead. Second stage: 27 cases; 12 alive and 15 dead. Third stage: 40 cases; 17 alive and 23 dead. Fourth stage: 10 cases; one alive and nine dead. Six cases were unclassified.

There were two cases of cervical stump carcinoma following subtotal hysterectomy, and both patients died of recurrence. It is a little unfair to include them, although we have done so, because it is impossible to insert the full dose of radium into the uterine cavity.

It will be noted that one patient with a fourth-stage carcinoma is alive and well after five years. Another patient in the same group was free from symptoms for four years but a recurrence developed during the fifth year. These results provide a strong argument for the use of radium in apparently hopeless cases.

Progress Following Treatment.

In the great majority of cases the malignant ulcer is healed when the patient reports three months after treatment, but we have had a few cases, not more than six, in which there was not any apparent retardation of the growth. As might be expected, recurrences are most frequently found in the region of the iliac glands. The effect of radium diminishes so rapidly with the increased distance from the object that any malignant cells already deposited in the iliac glands are liable to escape even when those in the cervix and immediate neighbourhood are completely destroyed. Indeed it is difficult to see how radium applied to the cervix can destroy malignant cells so far distant as the iliac glands. This would seem to be an argument in favour of the combined use of radium and surgery—in other words, a block dissection of the regional glands following radium treatment as is done in the case of malignant growths of the tongue.

In this connexion it may be mentioned that some years ago one of us (William Fletcher Shaw) performed the Wertheim operation in 63 cases after preliminary treatment of the cervix with radium: after five years only 22, or 34.9 per cent, were alive and well, a result not so good as when the operation alone was performed. These cases were treated before we owned our own radium, so the actual dose given is not known.

During the contraction of the scar tissue following the use of radium a few patients complain of severe pain in one side of the pelvis and radiating down the leg. This is very suggestive of recurrence in the iliac glands, and the fact that these are difficult to palpate until they have assumed a considerable size makes it impossible to determine in some cases whether there is recurrence or not.

One patient who was treated with radium in July 1929 had this severe pain towards the end of 1930 and during the early part of 1931. So severe was the pain that the abdomen was opened with the intention of removing the iliac glands or treating them with radium. No enlarged glands could be found, however, and the uterus, which was mobile, was removed by a simple panhysterectomy and the iliac area dissected out. No sign of malignancy was found by microscopical examination in either the uterus or the glands, and the patient has been free from pain since and has not shown any sign of recurrence of the growth.

Radium or Wertheim's Hysterectomy.

At present these are the only methods of treatment which hold out any reasonable prospect of cure. When better methods of treatment or prevention are discovered we shall no doubt remember our present comparative impotence with the same horror that some of us remember our complete impotence before the days of the Wertheim operation; but until that time arrives our choice must of necessity be limited to the two methods under discussion, and each gynaecologist must decide for himself which confers the greater benefit upon his patients.

It is very difficult to arrive at a decision from figures published by different operators and radiologists because so much depends on the stage of the growth, the competence of the operator or radiologist, the method of applying the radium, and, above all, the percentage of cases treated.

The only large series of figures of the Wertheim operation are those of Victor Bonney, and are as follows:—

Died of operation	55, or 14 per cent
Lost sight of	12
Died of other diseases	12
Recurrence within five years	155
Alive and well after five years	150, or 39 per cent
TOTAL	384

Bonney claims an operability-rate of 63 per cent, so his results show a five years' freedom from recurrence of all cases seen by him of 24.6 per cent.

After 10 years he has 20 per cent alive; but if those untraced or dying of other diseases are excluded he has 33 per cent alive.

In this country the only figures for radium treatment which can be compared with Bonney's are those of the Marie-Curie Hospital, London. Last year's report shows a total of 392 cases treated more than five years ago, and of these 142, or 36.2 per cent, are alive and well.

In 1934 Beckwith Whitehouse published the five-year results collected from St. Bartholomew's, the University College, the Middlesex, and the Marie-Curie Hospitals in London, the General Hospital in Birmingham, and the Royal Infirmary in Cardiff. The total number was 507, of which 56, or 11 per cent, were alive and well at the end of five years.

It is easier to decide which is the better method if one operator is able to publish statistics for both operation and radium, as errors dependent upon the personal factor are common to both.

One of us (William Fletcher Shaw) published his results of the Wertheim operation some years ago, and the cases are still being followed up; at the present time the results are as follows:—

Died of operation	33, or 21.4 per cent
Lost sight of	9
Died of other diseases	5
Recurrence within five years	48
Alive and well after five years	59, or 38.3 per cent
TOTAL	154

Of those patients operated upon more than 10 years ago there are 120, of whom, without making any allowances for those who have died of other causes or are untraced, 53, or 27.5 per cent, are alive to-day.

These results are so close to those of Victor Bonney—after five years 38.2 per cent alive as compared with his 39 per cent, and after 10 years 27.5 per cent as compared with his 20 per cent—that we may take them as representative of what can be done with Wertheim's hysterectomy. The only factor which is not comparable is the percentage of cases treated. Working in two large Manchester hospitals—the Royal Infirmary and St. Mary's Hospitals—it was impossible to arrive at an accurate figure without a very laborious search through out-patient records, but our impression is that our operability-rate was less than Victor Bonney's 63 per cent.

The results of our treatment with radium show that 41.4 per cent were alive and well after five years. Not only is this percentage greater than that obtained with the Wertheim operation, but cases are included of such an advanced character that no operation could have been performed. Our figures are small. Whether this high percentage of freedom from recurrence will be maintained when we have larger figures remains to be seen, but we are convinced that we are getting better results with radium than we did with Wertheim's hysterectomy, and, therefore, we can conscientiously save our patients the pain and discomfort of a trying convalescence. This does not mean that we are satisfied; no one can be with figures which show less than half the patients alive after five years.

In one of our hospitals all patients are now being given deep X-ray therapy after radium treatment, but this has been done for too short a time to allow of any comparison. Abroad, this combination seems to have given better results. It is also possible that a block dissection of the iliac glands might still further improve matters, though so far we have not been convinced of its efficacy.

While waiting for more efficient methods of prevention to be evolved we ought to employ the best available method at our disposal, and the figures which we have been able to put forward strongly support the view that the method is the application of radium and not the severe surgical procedure still favoured by many gynaecologists in this country.

Discussion.

The PRESIDENT congratulated Professor Shaw and Professor Dougal on their paper and on the excellence of their results. She read, on behalf of Mr. Malpas, the figures from the Liverpool Radium Centre of cases treated during the years 1929 and 1930, the total five-year survival rate of all cases treated being 33 per cent. The method used was that of Heyman, followed by deep X-rays. The President recalled a personal case in which death had occurred from pulmonary embolism.

Mr. BURNS asked if any of the patients had suffered from annular constriction of the rectum following treatment. He had observed the condition in two cases. He also expressed the view that radium therapy was well worth while even in very advanced cases, as it relieved pain and made the end easier.

Mr. T. F. TODD commented on the excellence of the results obtained, which he considered to be far and away ahead of anything else so far

achieved. Except for one single year's results from the Marie-Curie Hospital, he knew of nothing even comparable in the international literature. He considered that radiation was definitely preferable to surgery even in early cases; at least eight of the international radium centres had published a five-year survival-rate of over 50 per cent in operable cases, that is 10 or more per cent better than surgery. Mr. Todd recalled Beckwith Whitehouse's published figures of 500 cases treated by several teaching hospitals in this country. The five-year survival-rate was about 11 per cent—a marked contrast to the present series.

Dr. ELLIS gave figures from the Jessop Hospital for Women, Sheffield, showing a 30 per cent five-year survival-rate. It was customary in Sheffield to perform Wertheim's operation on patients in stage I, if fit for operation, after preliminary radiation. If the tumour was bulky and infected the patient had (1) X-ray treatment for two weeks to the whole pelvis; (2) two weeks of rest with douches; (3) radium; (4) one day later, Wertheim's operation; (5) if the glands were found to be involved, further X-ray treatment to the whole pelvis. If the tumour was small and non-infected the procedure was (1) a single dose of radium; (2) one day later, Wertheim's operation; (3) if the glands were found to be involved, a full course of X-ray treatment of the whole pelvis. Patients in stages II, III, and IV, were given X-rays, radium, and then further X-rays.

Dr. Ellis showed a series of slides, indicating the technique of the methods employed, also a slide to show the type of X-ray burn of the skin, which, while healing perfectly, might be thought by the uninitiated to indicate an overdose—being in reality the dose aimed at. He also quoted Döderlein's figures in operable cases, which showed 80 per cent five-year cures after complete radiation, as compared with 46 per cent after operation. They afforded adequate reason for Döderlein's having given up the operative procedure.

Dr. GERRARD drew attention to the excellence of the results in a series of cases which had been handled entirely by gynaecologists without resort to their radiological colleagues. Was this a point of importance—even significance? He thought so, particularly as there was a growing tendency in certain areas for the general practitioner to refer malignant cases directly to the radiologist. Was this in the best interests of the patient? A radiologist could hardly be expected to have had a wide experience in a special department of medicine such as gynaecology.

The diagnosis in carcinoma of the cervix, particularly of the endocervical type was not always easy, and the correct application of the radium was liable to present real difficulty, unless the operator was regularly engaged in vaginal surgery.

Mr. STACEY advocated Wertheim's operation in cases in the first stage and in cases early in the second stage with radiation, as this precluded the ill-health from cystitis and proctitis, which was liable to follow if radiation were employed alone. He considered that co-operation between gynaecologist and radiologist was advisable; the gynaecologist to diagnose the case and the radiologist to decide the dose and apply the treatment.

Professor MILES PHILLIPS also advocated the co-operation of gynaecologist and whole-time radiologist. He laid stress on the necessity of doing all one could to prevent carcinoma by the ruthless removal of the cervix whenever it

was found in a badly damaged or chronically infected condition. The fact that the annual mortality-rates showed, for a number of years, a steadily falling death-rate from cancer of the uterus, whereas that from cancer in all other organs was increasing, was at least highly suggestive that this method of preventive treatment was becoming effective.

Dr. CATHIE discussed the pathological aspect, referring to the grading of tumours as an aid to prognosis. He also referred to the question of radiosensitivity, and was inclined to disagree with the prevalent idea that the columnar-cell type of growth was radio-resistant.

Professor Dougal, in reply, stated that the authors considered their series to be a small one and that they had perhaps been fortunate in their results. He agreed with Mr. Todd that there was now no justification whatever for Wertheim's operation. Regarding the question of rectal symptoms following the application of radium, he had seen one case in which a fistula had occurred, but the dose given had been unduly high—11,000 milligram-hours. He considered that co-operation between surgeon and radiologist was undoubtedly desirable, though so far as the treatment of carcinoma of the cervix was concerned, the dose was largely standardized. He did not think that a radiologist was the best person to apply the radium in this region. Even an experienced operator sometimes found great difficulty in advanced cases with the insertion of the intra-uterine portion of the dose.

Professor Dougal agreed with Dr. Cathie that the columnar-cell type of growth was proving to be less resistant to radium than had been thought in the past.

MARCH.

A meeting of the North of England Obstetrical and Gynaecological Society was held in Liverpool on March 20th, 1936, with the President, Dr. RUTH NICHOLSON, in the chair.

Mr. J. ST. GEORGE WILSON reported

TWO CASES OF SIMMOND'S DISEASE.

This syndrome, which is most common in women, was first described in 1914, and is typified by progressive loss of weight, senile changes, such as loss of hair and an aged appearance, inhibition of the genital function, and amenorrhoea. Lassitude and weakness are marked. The basal metabolism is markedly lowered and the pulse-rate is slow. There is anaemia and there may be hypoglycosuria. Radiologically there may be enlargement of the sella turcica if the lesion is a neoplastic destruction of the pituitary gland.

The first patient, aged 29 years, had complained of loss of weight, following a normal confinement, her previous weight of 161 pounds having been reduced to 81 pounds within four years. There had been daily vomiting, dizziness, and loss of power in the left hand. She had, however, no loss of hair and did not look prematurely aged. She had complained of amenorrhoea for the last 12 months, menstruation having previously been irregular.

On examination she was found to be poorly nourished, having suffered from marked loss of weight. The blood-pressure was 114/72 mm. Hg. and

the pulse-rate 44. The cervix was multiparous and the body of the uterus small. Radiological examination of the skull revealed no abnormality. The blood-sugar was 81 milligrams per cent, non-protein nitrogen 33 milligrams per cent, and the Wassermann reaction was negative.

She was treated by injections of insulin and pregnyl; extra salt was added to the diet.

The second patient, who was aged 37 years, also dated her symptoms from a confinement. She had complained of loss of weight for 21 months, nausea for 20 months, and weakness for six months. She was stated to be looking much older than previously, and had experienced amenorrhoea for 28 months.

On examination her weight was found to be 66 pounds. She had hair on the face, pigmentation of the abdomen, a blood-pressure of 98, and a pulse-rate of 42. The urine was normal and an X-ray photograph of the skull revealed no abnormality. She complained of amenorrhoea constantly for the last 12 months, having previously had scanty periods at intervals of five to six months. On pelvic examination the uterus was found to be senile.

She was treated by injections of antuitrin S and oestroform and was given olive oil. Eight months later she had gained 42 pounds in weight.

Discussion.

Mr. S. B. HERD commented on the fact that in each case the condition had closely followed pregnancy. He wondered if in the past these cases had merely been considered as instances of superinvolution.

Mr. T. N. H. JEFFCOATE stated that he considered superinvolution of the uterus to be due to pituitary disease in all cases. He also questioned whether there was not an element of suprarenal malfunction as well in Simmond's disease.

Dr. E. A. GERRARD referred to the relation between prolonged suckling and superinvolution. He did not agree with the last speaker that there was of necessity a diseased pituitary.

Mr. F. E. STABLER asked if an Aschheim-Zondek test had been performed, as he had seen a case of the condition in which it was slightly positive.

Mr. St. George Wilson, in reply, stated that he thought there was a definite distinction between Simmond's disease and simple uterine superinvolution. In the latter condition there was no loss of weight or other disturbance, and he failed to see that it was necessarily due to pituitary disease. An Aschheim-Zondek test had not been done, but he would certainly have one carried out.

Mr. C. McINTOSH MARSHALL described

TWO CASES OF UTERINE RUPTURE ASSOCIATED WITH PLACENTA PRAEVIA.

In the first case the rupture was spontaneous, and in the second case it was traumatic, owing to a stomach tube, which had been inserted into the uterus as a means of inducing labour, having been passed through the uterine wall into the bladder.

The first patient was pregnant for the fourth time; she was aged 29 years. She was admitted to hospital, believing herself in labour, but the pains passed off. The pregnancy, according to the usual calculations, was at the forty-second week, the presentation was a right occipito-posterior, and the

head was high above the brim. Vaginal examination a week later revealed a lateral placenta praevia, the os admitting one finger. After a further week pains began spontaneously, and after nine hours in labour some blood and clots were suddenly passed from the vagina. Vaginal examination revealed that the cervix, though not too well taken up, admitted two fingers, and that the membranes were ruptured. The os was partially covered by the placenta, which was on the posterior wall of the lower segment. The child's head was macerated and there was marked overlapping of the anterior parietal bone over the posterior. Willett's forceps was applied to the scalp and a weight of one pound attached. No further bleeding occurred. Four hours later the child, which weighed 5 pounds 11 ounces, was delivered. It was macerated and had an offensive odour. No bleeding followed the birth of the child, but an hour later the patient's condition had deteriorated; she was pale and her pulse was rapid and soft. The placenta had not been delivered. Morphia and a saline were given and the foot of the bed was raised. During the next few hours her condition improved a little, and four hours after delivery it was decided to remove the placenta. As soon as anaesthesia had been induced a blood transfusion was commenced.

On passing the hand into the uterus a laceration was discovered in the lower segment. The abdomen was rapidly prepared and laparotomy was carried out on the labour bed. A large amount of free blood and the placenta were found in the peritoneal cavity. There was a vertical tear three or four inches in length in the posterior wall of the lower segment and cervix. Subtotal hysterectomy was performed and a drainage tube inserted. Convalescence was stormy, but eventually the patient made an excellent recovery.

Mr. Marshall referred to a case reported by De Sa, in which spontaneous rupture of the uterus had also occurred through the placental site.

The second patient was a primipara aged 22 years, who was six days past her expected date, the head being still above the brim. A stomach tube was inserted in the uterus by an experienced house surgeon. A general anaesthetic was not employed, but the tube was passed under direct vision—a speculum being employed—and the anterior lip of the cervix grasped with a pair of sponge forceps. When about two inches of the tube had been inserted some resistance was met with, but was easily overcome, and the rest of the tube was inserted without difficulty. Pains commenced five hours later, and after 10 more hours the cervix was almost fully dilated, the head, however, being still above the brim. The stomach tube had not been extruded. A catheter was passed and the urine was found to be heavily stained with blood. Mr. Marshall was then called to see the patient, and on cystoscopy the stomach tube, which had been palpated through the anterior vaginal wall, was clearly seen in the bladder. Delivery of a living child was effected by version and extraction, and the placenta, which was inserted low on the anterior uterine wall, was removed manually. It was noted that its lower edge was about an inch from the cervical lip. A median suprapubic incision was made, and the utero-vesical pouch of peritoneum was inspected. No injury was seen. The peritoneum was then closed, suprapubic cystotomy was carried out and the tube removed. The bladder was drained. Cystoscopic examination a month later revealed a small, slightly raised, puckered area lying behind the base of the bladder. This had a similar appearance to the cystotomy scar in the fundus.

Discussion.

Mr. St. George Wilson expressed a doubt whether, in the second case, the stomach tube had passed through the placental site. He was inclined to think that it had been forced through the wall of the cervix.

Mr. F. E. Stabler thought that the first case could hardly be considered one of spontaneous rupture, as Willett's forceps had been applied. Regarding the second case, he felt that a tube should never be passed without general anaesthesia. Apart from the difficulty which might be experienced, it was impossible otherwise to ensure an adequately aseptic technique.

Dr. E. A. Gerrard supported the latter observation, drawing attention to the morbidity which frequently follows induction with bougies.

Mr. C. H. Walsh questioned whether true spontaneous rupture of the uterus ever occurred. It was interesting to note that all cases reported had been in multiparae, and the suggestion was that trauma at a previous confinement was really the aetiological factor.

In reply, Mr. Marshall said that he felt quite sure that the tube had not perforated the cervix but that it had been deflected by the edge of the placenta and had passed through the placental site. He also referred to blood transfusion as a most valuable life-saving measure in cases of placenta praevia.

Mr. C. H. Walsh read a note on

Renal Calculi in Pregnancy.

It had been noted that renal stones were rare in pregnancy, this being accounted for by the fact that renal lithiasis occurs, as a rule, in women between the ages of 30 and 50 years, and most pregnancies occur before the age of 35 years. The condition presents many interesting features regarding diagnosis, the value of biochemical tests as a guide to treatment and prognosis, and the particular line of treatment to be decided upon. A further point of interest is the presence of ureteric dilatation normally occurring in pregnancy.

Mr. Walsh had seen three cases of renal lithiasis in pregnancy during the latter half of 1935. The first patient was pregnant for the third time and was 36 years of age. She was seen at the fourteenth week. She had complained of pain in the left loin for two years and it had become worse recently. The urine contained blood and bacilli coli, but no casts were present. The blood-pressure was 120/75 and the blood non-protein nitrogen 33 milligrams per cent. X-ray examination revealed two stones in the left kidney. Nephrolithotomy was decided upon in consultation with Mr. Ross, who removed the calculi. Convalescence was uneventful and the patient, whose urine became clear 10 weeks after the operation and remained so, was delivered at term of a child weighing 7 pounds 12 ounces.

The second patient was pregnant for the third time and was 30 years of age. She was first seen at the twentieth week of pregnancy. She then had albuminuria, but the blood-pressure was 120/75. She was regarded as a mild case of toxic albuminuria and treated as such, but the albumin increased in amount, so she was admitted to hospital for investigation. The output of urine was up to 67 ounces per diem. A trace of blood and a trace of pus were

found, and bacilli coli were present in moderate amount. The blood non-protein nitrogen was 45 milligrams per cent. The urea concentration was 1.85 at the third hour. The patient improved with rest and dieting, and was discharged two weeks later, the urine containing only a trace of albumin. She was readmitted at the thirty-sixth week with marked oedema, albuminuria, and slight hydramnios.

A large branched calculus was apparent in the right kidney on radiological examination. Mainly on account of the hydramnios and oedema, it was decided to induce labour at the thirty-eighth week. The labour and puerperium were normal. Three months later, after further renal investigation had revealed a functionless right kidney, nephrectomy was performed.

The third patient, a primigravida aged 20 years, was admitted to hospital at the twentieth week. She was acutely ill and had symptoms simulating acute appendicitis, though the urine contained some albumin and pus. An incision was made in the right iliac fossa, and an extraperitoneal abscess was found. In view of the fact that the condition might be a retrocaecal appendix, it was felt necessary to open the peritoneal cavity. This was done after careful packing-off, but the appendix was found to be normal. The extraperitoneal tissues were drained and the wound partially closed. The wound drained freely and the acute symptoms settled at once. The pus contained bacilli coli and non-haemolytic streptococci. An X-ray photograph taken 10 days later revealed a large calculus in the right kidney. The blood non-protein nitrogen was 32 milligrams per cent. The urea-concentration was 1.95 at the end of three hours. The wound had completely healed in six weeks, and though the surgeon was anxious for the pregnancy to be terminated so that the renal condition could be dealt with, Mr. Walsh decided not to interfere. She was kept under observation week by week, during which time her general health remained extremely good. Labour began at the thirty-eighth week, and the patient was delivered by the natural forces of a child weighing 5 pounds 4 ounces. The puerperium was uneventful and she was discharged on the twelfth day.

Mr. Walsh felt that there was a number of points of interest in the cases. First, regarding the diagnosis. In only one of the cases, the first, was it possible to suspect a renal calculus from the history, and in view of this it seemed likely that renal stones were not infrequently missed. Case two had been operated upon for chronic appendicitis and had been treated for toxic albuminuria before an X-ray photograph, on account of hydramnios, revealed the true state of affairs.

Regarding the investigations which are usually undertaken, he had been interested to know if there is any biochemical test which will serve as a guide to the prognosis and treatment in renal pathological conditions generally during pregnancy. After an investigation of a number of cases of toxic albuminuria with regard to blood-pressure, blood-urea, and blood-concentration findings and a correlation with the clinical results, he was of the opinion that only in the case of the blood-pressure was a reliable guide to be obtained. The urea-concentration and blood-urea were much too erratic to give any guide to the prognosis. These remarks applied particularly to toxic albuminuria, but were not considered out of place in discussing renal calculi.

Regarding the question of ureteric dilatation during pregnancy, a feature which was evident on the sound side in each of the three cases, demonstrated

by the injection of uroselectan and by X-rays: this was a normal state of affairs during pregnancy and had originally been attributed to pressure on the ureters at the pelvic brim by the pregnant uterus. There seemed little doubt, in view of recent work, that this theory was wrong, and that the true explanation lay in an altered endocrine function present in pregnancy and affecting all involuntary muscle; acting either directly or in conjunction with the sympathetic nervous system.

On the question of treatment of diseased organs complicating pregnancy, Mr. Walsh had formed the opinion that there was a widespread tendency towards terminating the pregnancy as a preliminary to surgical treatment. He considered this attitude to be entirely wrong and felt that, speaking generally, even severe surgical conditions could be dealt with, with little risk of interrupting the pregnancy. Applying these principles to the three cases under review, he considered that the first case was correctly treated by nephrolithotomy at the fourteenth week. In the second case the renal lithiasis was not diagnosed until the thirty-sixth week, and there was thus little to be gained and much to lose by surgical intervention at that time. In the circumstances induction of labour at the thirty-eighth week appeared to be rational. Looking back at case three, he felt that nephrectomy at the twenty-fourth week was the method of choice, despite the fact that, as things turned out, conservative treatment resulted in a live birth, leaving a diseased infected kidney to be removed later.

He summarized his conclusions as follows: (1) The diagnosis of renal stone is difficult and liable to be mistaken for conditions peculiar to pregnancy. (2) In reading radiograms during pregnancy after the intravenous injection of uroselectan, it should be remembered that there is normally a state of ureteric dilatation. (3) That urinary and haematological biochemical tests are of no help in the prognosis or as a guide to treatment. (4) That the guiding principle to treatment should be to remove the stones or the kidney and ignore the pregnancy.

Discussion.

Mr. J. W. BURNS agreed that the biochemical tests were of no value, and was pleased to hear Mr. Walsh had the courage of his convictions to say so. He felt that the blood-pressure was more useful as a guide to treatment in cases with albuminuria.

Mr. P. MALPAS felt that he could not agree with the previous speakers, and thought that the non-protein nitrogen had a certain value in eclampsia, especially if taken together with other findings and the clinical condition of the patient. If there was gross hepatic damage, the non-protein nitrogen might not be grossly increased, although the patient was gravely ill. He referred to six patients whom he had come across recently suffering from renal calculi.

Mr. A. A. GEMMELL supported Mr. Malpas and attached some value to renal efficiency tests during pregnancy. These were useful if they fitted in with the clinical condition. He had found the blood-urea and the urea-concentration tests improved in cases in which the foetus died *in utero*.

Mr. HAMILTON referred to a patient of his own with renal calculi who gave a history of haematuria for eight years. There was a large branched calculus in the left kidney. The pregnancy was allowed to continue until

the thirty-eighth week, when induction was carried out for disproportion. The haematuria disappeared after delivery.

Mr. C. M. MARSHALL thought that the hepatic damage vitiated the blood non-protein nitrogen results, and referred to a case in which he decapsulated the kidneys because of the clinical condition of the patient although the non-protein nitrogen was under 40 milligrams per cent.

Mr. T. N. H. JEFFCOATE gave a demonstration of

A SUCTION CURETTE,

which could be used as a diagnositic aid, particularly in cases of endocrine malfunction. An important feature was that an anaesthetic was not required.

Mr. C. HENDERSON showed

A SPECIMEN OF A PREGNANT UTERUS AND VESICAL CALCULI WITH BILATERAL PYONEPHROSIS.

EDINBURGH OBSTETRICAL SOCIETY

A meeting of the Edinburgh Obstetrical Society was held on May 13th, 1936, with the President, Dr. DOUGLAS MILLER, in the Chair.

Mr. W. A. COCHRANE read a paper on

BIRTH INJURIES OF THE CHILD.

Mr. Cochrane said the obstetrician, orthopaedic surgeon, and the neurologist found common ground on this subject, and by their united efforts much might be done to elucidate the problems relating to the birth injuries of the child. He confined his remarks to their mechanism, prognosis, and early treatment.

Congenital torticollis. It was recognized that there was an intimate relation between the presence of a tumour of the sterno-mastoid muscle and the subsequent development of wry-neck, and also that both these conditions had some connexion with long and difficult labour. An investigation of 30 cases of torticollis by Middleton showed that 25 gave a definite history of a sterno-mastoid tumour shortly after birth. The fibrosis in the muscle resulted from venous obstruction, oedema being one of the essential factors in producing the fibrosis. Brooks, of Chicago, in an interesting series of experiments, established the fact that ligature of the vein from a muscle produced massive replacement of the muscle by fibrous tissue. It is thought that such venous obstruction occurs if the head is placed in a position of extreme rotation, the tense muscle being capable of compressing the veins as they pass beneath it. This was the condition of the experimental muscle after venous ligation. It was claimed, therefore, that most cases of torticollis resulted from fibrosis in the sterno-mastoid muscle consequent upon the development and absorption of the so-called sterno-mastoid tumour of infancy, and that the sterno-mastoid tumour resulted from temporary acute venous obstruction in the muscle, this obstruction taking place during labour.

Obstetrical paralysis. The aetiology of this condition was discussed, and it was claimed that in birth palsy an injury of the brachial plexus occurred. The majority of cases occurred in infants born after a difficult or prolonged labour. In the available statistics, particularly those of Sever, of Boston, the vertex presentations out-numbered the breech presentations, boys and girls were equally affected, and the right arm suffered injury more frequently than the left.

The mechanism of injury was the stretching of the brachial plexus when the head was forcibly separated from the shoulder, but it was pointed out that actual tearing was most easily produced when the head was also rotated away from the arm on which traction was made. Such risks occurred when there had been failure of the shoulder to rotate in a vertex presentation. In the management of a breech presentation the same dangerous combination of rotation and traction could occur in the delivery of the head. With the

shoulder held and the head carried to one side, the clavicle being intact, considerable force was necessary to injure the brachial plexus. The fractured clavicle, by allowing the weight of the shoulder to drag upon the plexus, predisposed to greater injury from traction. The gravity of the lesion could be estimated only after a period of observation. In the whole-arm type complete and perfect recovery did not take place, as the rupture frequently occurred close to the intervertebral foramina; in the upper-arm type some return of voluntary power usually took place; in the lower-arm palsy the prognosis was unfavourable. Postural treatment, treatment in splints, massage, and re-education were discussed, and also the operative treatment by division of the tendon of the subscapularis muscle.

Injuries of the limbs. In the experience of Truesdell, birth fractures were always complete, and the presence of callus might be the first sign of the occurrence of fracture of the clavicle.

In the case of a fractured humerus a small, straight Thomas's splint might be used, as advised by Gibberd, using a thin elastic band as extension. By the second week after fracture it was possible to correct the remaining deformity by careful manipulation. Birth fractures of the humerus had been uniformly associated with some degree of paralysis of the radial nerve. This had never been observed to be permanent. It was important to note that birth fracture of the humerus with wrist-drop might be associated with Erb's paralysis, and it was important that the latter should not be overlooked.

In fracture of the femur the upper fragment was abducted, flexed, and externally rotated, and the lower fragment must be brought into line with it by bandaging the limb to the trunk. The injured limb was best brought over as far as possible towards the opposite side of the body. There was not the same tendency to remodelling of malunion in this fracture as compared with fracture of the humerus.

Spastic paralysis. Cerebral paralysis in children may result from causes which were antenatal, natal, or post-natal. It was doubtful whether the natal causes produced the majority of cases of spastic paralysis which were dealt with in practice. There was a considerable body of opinion that the congenital diplegies, which constituted by far the largest group of infantile spastic palsies, were not to be attributed to meningeal haemorrhage at birth, but were the result of various pathological processes of intra-uterine origin. A variety of spastic paralysis which required special mention was that due to injury of the spinal cord itself. Ford, Crothers, and Putnam had drawn attention to this form of trauma, and thought it required greater recognition than seemed at present to be the case. The injury occurred during traction in delivery. The prognosis from orthopaedic care in cases of spastic paralysis in which there was not much mental enfeeblement or athetosis was fairly good.